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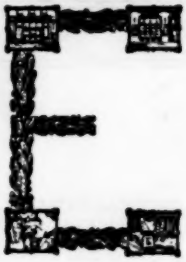

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Delivered at the London Hospital on Nov. 2nd, 1928,

BY CECIL WALL, D.M. OXF., F.R.C.P. LOND.,
PHYSICIAN TO THE HOSPITAL.

IN his Lumleian lectures last year Sir Charlton Briscoe [1] pointed out that the mechanical side of the respiratory mechanism has received less attention than it deserves. With this statement all those who devote special attention to diseases of the chest will be in agreement, and they will concur with him in the belief that the difficulty of the subject provides the explanation.

Briscoe combined experimental and clinical methods in a masterly manner in the endeavour to elucidate certain aspects of the subject. For many years my own work has afforded me numerous opportunities for the close clinical study of the muscular mechanism of respiration, but the problems which I have attempted to solve are different from those which he investigated, and my method has been perforce confined to the testing, by observation at the bedside, of a succession of hypotheses propounded by others or by myself. The problem which I propose to discuss to-day is that of the muscular mechanism of expectoration or, in the words of the late Dr. F. J. Smith, of the cough useful as opposed to the cough ornamental.

THE MECHANISM OF EXPECTORATION.

Expectoration is effected by raising the intra-pulmonary air pressure and then suddenly allowing the air to escape and carry with it any peccant matter that may be lying in the air passages. It follows, therefore, that the requisite modification of expiration must be preceded by inspiration, and to a great extent its mechanism will be modified by the position of the thorax at the commencement of the expiratory effort. The cavity of the thorax is enlarged during inspiration partly by descent of the diaphragm, working as Halls Dally [2] has shown as a piston works in a cylinder, and partly by the movement of the ribs. The older view, that the action of the diaphragm is due to the flattening of its curvature, seems to be now completely abandoned. However, it must be admitted with Keith [3] that, owing to the resistance of the abdominal viscera and to the situation of its attachments, the diaphragm in contracting tends not merely to lower the central tendon, but also to elevate and to some extent constrict the costal margin. This seems to be the obvious explanation of what is known as John Howard's experiment, on which Makuen, [4] apparently alone among authors, relies for his assertion that the diaphragm is an expiratory muscle. This experiment may be carried out as follows :—

> The hand is placed on the epigastrium while a forcible inhalation is made, the abdominal wall being pushed forward as the diaphragm contracts. If then at the end of the maximum inspiratory effort, while the breath is held, the diaphragm is allowed to relax and the abdominal wall to recede, more air can then be inspired as the lower ribs can now move further upwards and outwards.

The constricting action of the diaphragm is also proved by the observation originally made by Gerhardt [5] in 1860, and more recently confirmed by Pasteur, [6] that in diaphragmatic paralysis there is an increased movement of the lower ribs.

MOVEMENT OF THE RIBS.

The movement of the ribs has been the subject of much controversy since the view expounded by Galen in the second century—that the upper intercostals, both internal and external, lifted the ribs while the lower set depressed them—was disputed by Vesalius in the sixteenth century; and the controversy is evidently not yet settled, seeing that two standard English text-books of anatomy [7] [8] adopt contrary views.

It is not possible for me to describe now the various views which have been held. I can but tell you the conclusions which I have reached by clinical observation. I will discuss first the movement of the ribs and then the muscles which accomplish the movement.

Keith [3] pointed out that only the first ten ribs take part in thoracic respiration, the eleventh and twelfth ribs, with their single articulations to the vertebral bodies, forming part of the abdominal wall. Following Keith again, the first ten ribs may be considered to form two groups. The first group consists of the first two pairs of ribs together with the manubrium sterni; this group, he said, constituted the "operculum thoracis." The second group consists of the third to the tenth pairs with their cartilages and the gladiolus of the sternum.

The first two ribs have a double articulation with the bodies of the vertebræ and with their transverse processes, but as the transverse processes are not set back far the hinge-joints permit an up-and-down or pump-handle movement with very little if any eversion. The four articular surfaces of each pair of ribs are not in a perfectly straight line, but as Volkmann showed, if the axes of the hinge-joints were produced forwards they would include an angle of about 135°. The result of this arrangement is that the operculum thoracis moves up and down in a manner comparable with the lid of a box on its hinges.

The movement of the second group of ribs is determined by the axes of the double costo-vertebral articulations. Passing downwards the transverse processes are set progressively further back, so that, to use Volkmann's measurements again, if the axes of the hinge-joints of the pairs of ribs be produced forwards they will intersect within the chest and include angles which diminish from above downwards until the included angle is a right angle or even less (88°). Furthermore, it must be pointed out that these axes of the hinge-joints are horizontal, and if produced forwards would meet the wall of the opposite side of the chest. The bony ribs being sharply curved and sloping downwards and forwards below the horizontal the posterior upward torsion of the rib, which puzzled Hutchinson [9] so much, seems to be a necessity.

It is admitted by all modern authorities, with the possible exception of the author of the last edition of Gray's "Anatomy," that the arrangement of these hinge-like costo-vertebral articulations only permits movement round the axis of the hinge—that the rib being curved moves like a bucket-handle and not like the handle of a pump. Hutchinson, [9] in spite of the meticulous care with which he investigated the anatomy of the thorax, did not realise this; he speaks of the ribs having two movements, the one up and down like a pump-handle, the other a movement of eversion which he thought was due to the rotation of the curved arc of the rib about its chord which he describes as joining the head with the anterior extremity. It does not appear to me to be mechanically possible for the ribs to execute the double movement, and furthermore clinical observation seems to demonstrate that it does not occur. Hamberger, [12] on the other hand, describes the movement correctly: "Each of the ten upper ribs," he says, "has its own fixed point on that line which can be drawn horizontally from the transverse process of the vertebra to a disc between the bodies of the two vertebræ with which the head of the rib articulates, and round this line the ribs move up and down."

If the chest of a healthy person be watched during inspiration it will be found that the body of the sternum does not swing forward markedly as it would if the ribs had a pump-handle action, but in moving upwards remains almost vertical, such movement being permitted by flexion of the angle of Louis. In certain abnormal conditions, for instance, when there is a funnel sternum or the pericardium is adherent to the sternum, the elevation of the ribs is accompanied not by an advance, but by actual recession of the

sternum. Again, if the ribs had this pump-handle movement the explanation of unilateral immobility of the thorax in pleurisy or pneumothorax would offer great difficulties.

I feel forced to adopt the view that the ribs have one movement only—that is, round the axes of their articulations with the bodies of the vertebræ and the transverse processes. The reason for the cartilages, and probably for the absence of the external interchondral muscles, seems to be found in the fact that the axes of rotation intersect within the thorax; if the anterior parts of the ribs were rigid the rotation of a pair of ribs about their axes would be mutually antagonistic, and this seems to be the case when pathological rigidity has supervened. The ribs are not horizontal, but slope downward; in inspiration they rotate upward. It is obvious that the more they slope downwards the less will be their perpendicular distance from the mid-line of the body, and the more nearly they approach the horizontal position the greater will be that distance; it is to this fact that the thoracic expansion in inspiration is due. As Luciani [15] shows, the point on the convexity of the rib through which passes a tangent parallel to the axis of rotation is the point which will rise most during the upward rotation of the ribs in inspiration. The obliquity of the axis will throw this point in front of the mid-line of the axilla.

Sewall and Pollard [10] claim to have demonstrated that costal respiration is more efficient than that effected by the diaphragm; over a long series of experiments measuring the vital capacity they found that if the diaphragm only was used for inspiration and expiration the average volume was 1341 c.cm., whereas if the ribs only were used the volume was 2139 c.cm. Mosso [11] found similarly that with thoracic respiration he inspired 2025 c.cm., whereas with abdominal respiration he inspired only 1350 c.cm.

Muscular Action.

Great has been the controversy with regard to the movement of the ribs in respiration, but still greater and much more acrimonious has been the controversy with regard to the muscles causing the movement.

The view which seems to satisfy best my own observations is that originally expounded by Hamberger,[12] accepted with slight modifications by Hutchinson [9] and by many others including one of the most recent authorities, Sir Charlton Briscoe.[1] This view is that ordinary quiet inspiration is effected by contraction of the external intercostals acting in concert with the interchondrals of the opposite side of the chest, the fibres of the two muscles being parallel, and that ordinary quiet expiration is an active process brought about by contraction of the internal intercostals and the triangularis sterni (transversus thoracis and possibly morphologically representing the internal interchondrals) and aided by gravity and the elastic recoil of the resilient chest walls.

The chief rival view was originally put forward by Aranzi, of Bologna, and van Helmont, of Amsterdam, and was recently resuscitated by Sir Arthur Keith,[3] and has been adopted by the author of the last edition of Gray's "Anatomy." [8] These authorities hold that the function of the intercostal muscles is merely passive and designed to prevent the indrawing of the intercostal spaces during inspiration. An opinion with such weighty support cannot be dismissed summarily, but my objections to it seem insuperable.

In the first place, going back as far as Hamberger and Haller, it seems to me that Hamberger's mathematical argument is sound; if two parallel rods kept parallel, move about two fixed fulcra, and two elastic bands crossing each other at an angle are fixed to the two rods, it necessarily follows that as the two rods approach to and recede from the horizontal one band will be relaxed and the other will be stretched; it is not possible for the tension on the two bands to be altered equally and in the same direction. The ribs and the crossing fibres of the intercostal muscles are comparable with such rods and bands.

Next I am in sympathy with Haller's note of doubt sounded toward the end of his attack on Hamberger: "Why should there be two sets of intercostal muscles if indeed the function of each is the same?"

Thirdly, the experiment of Newell Martin,[12] which showed that the external intercostals contract synchronously with the diaphragm and the internal intercostals alternately, is not to be explained, as Keith suggests, as a result of the injury to the animal. Newell Martin was not an amateur or inexperienced investigator, and he found that the contractions synchronised or alternated with the contractions of the diaphragm and were not irregular, as would have been the case if injury were responsible. Furthermore, we find in the wards that lesions of the lower cervical cord which lead to paralysis of the intercostal nerves are associated with cessation of costal respiration, ventilation of the lungs being maintained by the action of the diaphragm.

Finally, if the intercostal muscles are not responsible for the movement of the ribs it becomes necessary to discover how they are moved.

The exponents of the passive theory do not specify the muscles concerned with costal respiration if the intercostals do not act. Muscles passing from the shoulder-girdle would be of but little value unless the shoulder-girdle were fixed. Therefore they must assume that the muscles passing from the spine or skull to the thoracic cage perform the function—e.g., scalenes, sternomastoids, levatores costarum. Keith agrees that the levatores costarum are lateral flexors of the spine and not important elevators of the ribs. It is not possible to investigate their activity clinically; but the scalenes and sternomastoids are accessible, and clinical observation gives frequent opportunities for investigating their contraction; with the finger in the suprascapular fossa or placed over the sternomastoid their contraction can be felt easily when the chest is rigid or in the full inspiratory position. For instance, when the thorax is raised during an attack of spasmodic asthma or in spontaneous pneumothorax, the activity of these muscles during inspiration is easily demonstrable, but unless there is unusual effort caused by some such condition as I have described evidence of their contraction is not forthcoming.

If the thorax can move freely even extraordinary inspiration does not seem to call into play the scalenes or sternomastoids; but when the chest is partly handicapped, as in an asthmatic between paroxysms, then an extra inspiratory effort may be found to call into action the extraordinary muscles of inspiration. In such cases, too, during inspiration we may feel the lumbar muscles contracting presumably to fix the lower ribs so as to give the diaphragm a fixed point on which to pull.

The arguments in favour of the external intercostals being the chief muscles of ordinary inspiration strongly favour the view that the internal intercostals and the triangularis sterni are the chief agents in ordinary expiration. Keith [3] has pointed out the improbability of expiration being merely the result of gravity and elastic recoil, and his view is in accord with the modern idea of the synergic action of muscles.

Expiration is much more closely under voluntary control than is inspiration. Speaking, singing, sneezing, coughing, are expiratory acts largely determined by the will, and it is possible by careful observation to arrive at some conclusion with regard to the muscles involved.

Expiration.

Setting aside as fanciful Makuen's [4] idea that the diaphragm may have an expiratory function, we may consider how the diminution in the volume of the thorax is brought about. Elastic recoil and gravity undoubtedly play a part, but as expiration is not obviously hampered in a healthy person by inversion there must be other forces at work. Muscles other than the internal intercostals which by their contraction can depress the ribs and contract the thorax, are superficial and their contraction can be felt. In ordinary expiration evidence of such contraction,

except perhaps in the case of the transversalis, is not forthcoming. It seems, therefore, fair to assume that the internal intercostals and triangularis sterni are the muscles chiefly concerned with quiet expiration.

Expiration has much more power than inspiration. Hutchinson [9] measured this in inches of water.

Inspiration.		Expiration.
1·5	Weak.	2·0
2·0	Ordinary.	2·5
2·5	Strong.	3·5
3·5	Very strong.	4·5
4·5	Remarkable.	5·8
5·5	Very remarkable.	7·0
6·0	Extraordinary.	8·5
7·0	Very extraordinary.	10·0

In forced expiration many muscles are called into play. The transversalis acts partly by compressing the abdominal viscera and so forcing the diaphragm upwards and partly by constricting the lower outlet of the thorax. When extra effort is required—for instance, in the act of coughing—all the muscles passing between the pelvis and thorax may be called into action. Of these the most important appear to be the recti and obliques together with the ilio-costalis and the pelvic portion of the latissimus dorsi, the contraction of which can often be seen and felt with the greatest ease. In extraordinary expiratory effort not merely is the thoracic outlet constricted, the diaphragm driven up, and the ribs depressed, but there is in addition a flexion of the thoracic and cervical spine to aid the depression of the ribs.

Clinical Applications.

This study of the muscular mechanism of expiration would have but little clinical value unless it were possible to make a practical application in the treatment of disease.

One of the simplest applications of our knowledge may be found in the dietetic treatment of chronic bronchitis or a tendency to recurrent bronchitis in a patient with abdominal obesity. The reduction of his girth will in many ways assist in the descent of the ribs and constriction of the thoracic outlet and so permit easy and beneficent expectoration. Another application may be found in the treatment of active hæmoptysis. Not infrequently in this condition we find the patient kept lying flat; in this position he is unable to cough and expectorate easily, and as a result with each gush of blood he starts up in bed and leans forward in order to get rid of it. This movement cannot be beneficial. It is far better to allow the patient to be in a semi-sitting position so that expectoration may be accomplished with the least effort. In addition, the effect of gravity in lowering the pulmonary blood pressure is probably advantageous by promoting clotting. Concomitant fainting may not be a disadvantage.

In the treatment of all kinds of cough associated with expectoration it is an advantage to allow the patient to sit so as to fix the pelvis and to bend the spine and neck forward so as to aid the depression of the ribs. If there is inspiratory difficulty at the same time the patient should lean on something firm so as to fix the shoulder-girdle and give the muscles of extraordinary inspiration a fixed point from which to act. The child with pertussis likes its mother to hold its head during the inspiratory whoop.

Operative Measures.

Within the last few years the method of paralysing one-half of the diaphragm by evulsion of the phrenic nerve has been used in the treatment of diseases of the lung. This operation has the effect of permitting partial collapse of the lung, the dome of the paralysed half reaching as high as the fourth or even the third costal cartilage as shown by radiography. During inspiration the failure of the diaphragm to descend checks the expansion of the apex of the corresponding lung while the costal movement still secures the expansion of the lower part and is to some extent facilitated by removal of an antagonistic force; the rest thus secured to the affected apex seems to explain the benefit following the operation in certain autotoxic cases of pulmonary tuberculosis.

It is not always sufficiently realised that the descent of the diaphragm is the chief cause of the expansion of the apex of the lung; radiographers are emphatic on this point, and perhaps it is due to this that the abdominal-breathing male is more commonly attacked by tuberculosis than the costal-breathing female.

Expiration is also modified by diaphragmatic paralysis. In the ordinary movements of quiet respiration there is not much difference to be noted, but with forced expiration—for instance, in coughing—the effect of abdominal constriction seems to be markedly enhanced, and to this seems attributable the benefit resulting from evulsion of the phrenic in basal bronchiectasis. In this condition the rise in the level of the diaphragm is not likely to lead to collapse of the thickened and rigid bronchial tubes, and in the majority of cases there is not much aerated lung tissue left. The undoubted improvement which frequently follows the operation must be attributed to the greater ease of expectoration which prevents the stagnation and decomposition of the secretions in the dilated tubes. The quantity of sputum may not be greatly diminished, but usually there is an early and marked reduction in the fœtor.

The operation of evulsion of the phrenic should be undertaken only after careful investigation of the muscular movements of respiration in the individual patient. If there is any difficulty in costal respiration paralysis of the diaphragm is likely to have serious results. A raised and rigid chest with respiration totally of the abdominal type would be an obvious contra-indication, but it seems necessary to exercise the greatest caution if the patient has to use such muscles as the scalenes in ordinary inspiration, and even if he calls them into action when taking a deep breath. I feel that this word of warning is necessary in spite of Lange's [14] statement that in elderly people, in whom diaphragmatic breathing more or less predominates, phrenicotomy does not lead to respiratory embarrassment.

The Raised and Rigid Chest.

How to aid the mechanism of coughing and expectoration when the chest is raised and rigid is a problem which is most difficult of solution. It is not infrequently held that the thorax becomes rigid owing to calcification of the costal cartilages. A study of radiograms of the chest shows that this is certainly not a complete explanation. The chest may be raised and rigid though there is no evidence of calcification; on the other hand, marked calcification is sometimes found in quite young persons whose costal movements are free. The chest may be raised and the ribs nearly horizontal, as in the so-called "artilleryman's chest" and in the child before puberty without any evidence of rigidity, and sometimes the chest may be rigid and moving as a whole, though the ribs are depressed and sloping. Sometimes—for instance, during an attack of spasmodic asthma—the raising of the chest and the inhibition of costal movement is only temporary, and again costal respiration may become impossible owing to some lesion of the lower cervical or upper dorsal region of the cord.

At times one is tempted to seek the cause of thoracic rigidity in some lesion of the costovertebral articulations, but unless there is evidence of spondylitis logical support of the speculation is seldom forthcoming. In all such conditions, however, a knowledge of the mechanism of expectoration may be of great assistance in reducing the discomfort of the patient.

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THE ULTIMATE RESULTS OF QUINIDINE THERAPY IN AURICULAR FIBRILLATION.

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THE observations of those who first used quinidine in the treatment of auricular fibrillation showed that normal rhythm could be restored in at least 50 per cent. of the cases treated. Soon, however, it became apparent that it was only in a much smaller number that normal rhythm was maintained. Some patients revert almost immediately to fibrillation, while others in whom sinus rhythm has persisted for weeks, months, or even years, eventually relapse. The mere restoration of normal rhythm is therefore no criterion of the value of quinidine as a practical therapeutic agent; and whether this drug will still be regarded as a useful remedy in years to come depends, not on its capacity to convert fibrillation to normal rhythm, but rather on considerations such as (1) the percentage of cases in which normal rhythm is more than a merely transient event, (2) the benefit which accrues from the restoration of normal rhythm, and (3) the dangers incidental to the use of quinidine. The sudden appearance of heart failure which frequently accompanies the onset of fibrillation is due, in part at least, to the increased heart rate. This can often be controlled by digitalis. So if quinidine is to "win its spurs" in the field of practical therapeutics, it must be shown that the condition of the patient in whom normal rhythm has been restored by its use is at least as good, if not better, than that of his fellow sufferer in whom the ventricular rate is held in check by digitalis.

Method of Investigation.

With a view to ascertaining the ultimate results of quinidine therapy we have followed up the after-histories of an unselected † group of patients treated with the drug in the Manchester Royal Infirmary during the past six years. When we first began to use quinidine we were groping in the dark, for we did not know in what type of case the drug was most likely to prove beneficial. Consequently, in the light of further experience, we should now regard some of our earlier cases as unsuitable, and would prefer to treat them with digitalis. Nevertheless it is instructive to consider the effects of quinidine in these cases, even if merely to emphasise the importance of judicious selection.

Chronic, as opposed to paroxysmal, auricular fibrillation is especially liable to occur in association with three pathogenic processes: (1) rheumatic infection of long standing, (2) degenerative myocardial fibrosis, and (3) thyroid intoxication. To the last of these we do not propose to refer in this paper, for the observations of F. R. Fraser [5] and his co-workers have shown that in this type of case normal rhythm can easily be restored and maintained, provided the source of the underlying toxæmia be first removed by adequate surgical measures, whereas, so long as hyperthyroidism persists, there is a strong tendency to relapse. Our own observations entirely corroborate Fraser's views.

It is not always easy to determine with certainty the ætiological factor in chronic fibrillation. The recognition of the thyrotoxic cases rarely presents much difficulty, but the hearsay evidence of supposed rheumatic infection is often unconvincing. Putting on one side the cases with a clear history of heart trouble dating from an attack of rheumatic fever or chorea in childhood, there remain those in which the signs of heart disease were first noticed in early adult life. These patients may, or may not, give a definite history of acute or subacute rheumatism. Some have mitral stenosis, while in others auscultation fails to reveal any sign of a valvular lesion. For the purpose of the present investigation we have regarded these cases as probably rheumatic, though we are bound to admit that the evidence on which the diagnosis rests is not always conclusive. Similarly, we have classified as "fibrotic" those in whom the cardiac symptoms appeared insidiously during the degenerative period of life.

Since our object is to ascertain what eventually happens to these patients, we have excluded from this survey all those who first came under treatment within the past two years. This leaves us with 27 cases, all of which have now been kept under observation continuously, so long as their rhythm remained normal—that is, say, for varying periods up to five years. We arbitrarily selected the period of two years, in the hope that by the end of that time the cardiac mechanism would have become sufficiently stable to afford a reliable guide to the more remote prognosis.

In the title of this paper we have used the words "ultimate results of quinidine therapy." To have done so is perhaps misleading, for the term ultimate suggests finality, and should therefore strictly be employed only in the case of those patients whose after-histories have been followed up to the time of their death. Our reason for choosing this title was to indicate that we were concerned not with the immediate, but with the more remote results of treatment, and we have included not only those patients who have died, but also those who are still living.

Classification of Results.

The classification adopted requires a word of explanation. We have divided our cases into two groups—"successful" and "unsuccessful." Each of these groups has again been subdivided. The successful group includes those patients who derived definite benefit for a considerable period of time from the restoration of normal rhythm. From a practical standpoint these cases may all be regarded as successful, though the measure of success which they achieve varies considerably. The most successful subgroup consists of those in whom normal rhythm was restored more than two years ago and who are still normal at the present time. Some of these have had relapses during the period of observation, but the normal mechanism has been easily restored by further courses of quinidine. Less successful are those who remained normal for two years or more (with or without relapses), but subsequently reverted to established fibrillation. We were at first inclined to regard these cases as unsuccessful, but the fact that they did derive definite and prolonged, though only temporary, benefit, seemed to justify their being considered as at any rate partially successful. The "unsuccessful" group includes (*a*) those patients in whom quinidine failed to produce normal rhythm, (*b*) those who

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† All patients in whom treatment was controlled electrocardiographically have been included.

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relapsed soon after the restoration of normal rhythm, and (*c*) those in whom normal rhythm was restored and maintained, but who died within a few months of discharge from hospital, or derived no obvious benefit therefrom. It must be recognised that there is no hard-and-fast line between these different groups. Probably some of the cases which failed to respond would have turned over if more quinidine had been given; but, in view of our experience that cases in which large doses of quinidine are required to produce normal rhythm tend to relapse, we did not feel justified in pushing the treatment farther. Similarly, some of the early relapses might have been prevented if the change to normal rhythm had been followed up by a larger "holding dose" of quinidine. On the other hand, there are the cases at present normal. There can, we are afraid, be little doubt that some of these will sooner or later revert permanently to fibrillation, and fail to respond to further courses of quinidine. Though fully conscious of its inherent defects, nevertheless we are inclined to think that a classification such as this does serve a useful purpose by helping to give some indication of the scope of quinidine therapy. Of our 22 rheumatic cases 7 failed to respond, 3 died within a few months of the restoration of normal rhythm, 1 died after maintaining normal rhythm for 19 months, 4 relapsed early, and the remaining 7 were "successful." Of the 5 cases in the fibrotic group 2 were "successful," 1 failed to respond, 1 relapsed early, and 1 died shortly after the restoration of normal rhythm.

	Rheumatic.	Fibrotic.
A. *Successful.*		
1. Still normal	5	2
2. Normal for over two years	2	0
Total	7 (32%)	2 (40%)
B. *Unsuccessful.*		
1. Failed to respond	7	1
2. Relapsed	4	1
3. Died	4	1
Total	15	3

It is interesting to compare these figures with those given by Hay [8] in his report of cases collected from members of the Cardiac Club in 1923. He divides his cases into two ‡ groups, according to whether fibrillation was, or was not, associated with valvular disease of the heart, and each group into three classes—(1) failures, (2) temporary successes, and (3) permanent successes. Hay's class 1 corresponds to our B1, his class 2 to our B2, and his class 3 § to our classes A1 and 2. His figures are as follows:—

	Group 1 (with "V.D.H.")	Group 2 (no "V.D.H.")
Class 1 (failures)	78	28
„ 2 (temporary success)	42	24
„ 3 (permanent „)	46 (27%)	35 (40·2%)
	166	87

Our figures are much too small to have any statistical value, but so far as they go, since most of the cases in Hay's group 1 were probably rheumatic, there is a fairly close agreement.

Group A. Successful Cases.

CASE 1.—A tramcar trolley boy, aged 18, was admitted to hospital in April, 1923, with rheumatic carditis, early mitral stenosis, and auricular fibrillation. 1·2 g. of quinidine restored normal rhythm, which has persisted ever since without further treatment. Since September, 1923, he has been working at a tram depôt 48 hours per week. In June, 1926, the heart was slightly enlarged with a systolic and a short diastolic murmur at the apex. His only spell off work during the whole of this period was three weeks in December, 1927, when he complained of "rheumatic" pains in the arms and abdomen.

CASE 2.—A commercial traveller, aged 38, was first seen in July, 1924, complaining of palpitation and pain in the chest of several weeks' duration. For some years he had had attacks of "palpitation" lasting for half an hour up to several hours. He had always been very active and played golf and lacrosse. There was a history of rheumatism as a child and scarlet fever in 1903. The heart was not enlarged, but its action was irregular and there was an apical systolic murmur. The electrocardiogram showed auricular fibrillation. In May, 1925, he was admitted and treated with quinidine. Six doses of 0·4 g. restored normal rhythm. This has been maintained without relapse up to the present date. Ventricular extrasystoles cause palpitation at times, chiefly at night. He is able to walk several miles daily, and to go upstairs without distress or shortness of breath.

CASE 3.—A motor driver, aged 41, was admitted to hospital in September, 1925, complaining of dyspnœa and pain in the stomach which troubled him chiefly at the end of his day's work. Dyspnœa had been present for a year and the "dyspepsia" for about five months. He had had bronchitis each winter for several years and two attacks of "influenza," the last in 1922. As a child he had chorea. Auricular fibrillation was present on admission and had probably existed for a year. The resting heart-rate was about 80 per minute. There was an accentuated first sound and a systolic murmur at the apex. The maximal impulse was in the fifth space in the mid-clavicular line, but the area of cardiac dullness was not increased to the right. Quinidine treatment was commenced on Oct. 7th and the heart became regular on the 9th, after six doses of 0·4 g.; 0·2 g. of quinidine was taken daily until October, 1927, when the patient had to be operated on for acute appendicitis. Since then he has had no quinidine, but nevertheless the cardiac mechanism has remained normal.

FIG. 1.

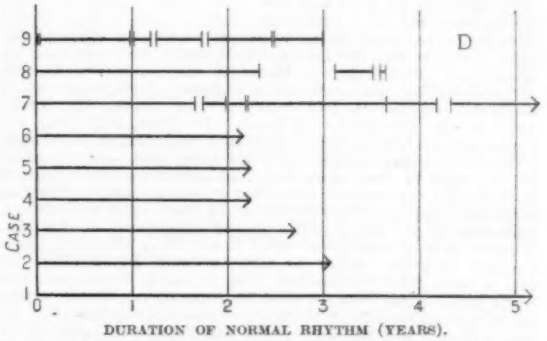


Diagram to show duration of normal rhythm in the nine "successful" cases. Breaks in the lines indicate relapses. An arrow indicates that the patient continued to exhibit normal rhythm, at the time this paper went to press. D (Case 9). This patient died 17 months after his final reversion to fibrillation.

CASE 4.—A pressman in a rubber factory, aged 31, was admitted to hospital in February, 1926, with dyspnœa and palpitation, which had troubled him since 1923 and had been worse for six months before admission, though he had been able to carry on his work until January. There was a history of sore-throats, but there had been no other rheumatic manifestations. He was refused for the Army in 1915 on account of V.D.H. On admission to hospital he was found to have mitral stenosis and auricular fibrillation. Quinidine was given from March 5th to 11th without success (total 4·6 g.). A second course on March 30th–31st, consisting of four doses of 0·4 g., restored normal rhythm, which has been maintained up to the present date. A daily holding dose of 0·2 g. has been given since normal rhythm was first restored. This patient was able to resume his work in April, 1926, and has worked continuously ever since. He now has dyspnœa only after unusual exertion.

CASE 5.—A pattern maker, aged 59, was admitted to hospital in April, 1926, with orthopnœa and œdema of the legs. He had only left off work a few days previously. The heart was considerably enlarged to the left. Auricular fibrillation was present with an apical systolic murmur and a poor first sound, the second sound being accentuated at the base. The blood pressure was raised. There was no rheumatic history. A drachm of the tincture of digitalis was given every six hours for four days and smaller doses for the next week. This was followed by quinidine (0·8 g.) during the next two days, and normal rhythm was restored. He has not done any active work since discharge from hospital in May, 1926, but is able to enjoy a quiet life, and there has been no tendency to revert to fibrillation.

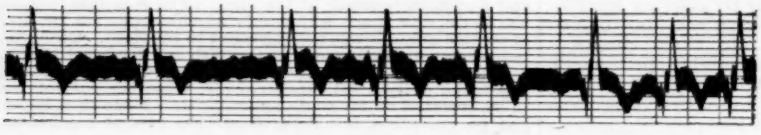
‡ With his third (the thyrotoxic) group we are not concerned in this paper.

§ The patients we classified as B3 might have been in either class 2 or 3 of Hay's series.

CASE 6.—A carter, aged 62, who had previously had good health, was treated with quinidine sulphate in March, 1923, for auricular fibrillation, which had probably been present for six months, during which period he had been short of breath and had complained of some epigastric discomfort. There were no signs of congestion. The first sound was somewhat impure at the apex, and both sounds were faint at the base. 4·0 g. of quinidine, given during a period of four days, produced pure flutter (Fig. 2), and the drug was discontinued for ten days. Fibrillation returned (Fig. 3). 1·6 g. in a day then sufficed to produce normal rhythm, which was accompanied by a definite improvement in the subjective symptoms. In this case a diffuse rash of small red macules appeared on the chest, abdomen, and upper part of the back, after quinidine. It itched at first, but gradually faded and then ceased to cause trouble. Normal rhythm (Fig. 4) persisted for 20 months, and then auricular fibrillation recurred for no apparent reason, in spite of the fact that he was taking a small daily holding dose of quinidine. The drug was therefore increased (Fig. 5), and normal rhythm was restored in January, 1925, since when auricular fibrillation has recurred four times. In April, 1925, it was present for 24 hours. In June, 1925 (Fig. 6), it was present for five days following a cold, and in December, 1925, the patient reported that the heart had been irregular for a period of five hours, but had spontaneously returned to normal. On each of the other occasions normal rhythm was easily restored by quinidine. In May, 1926, the patient was able to get about without any symptoms of distress. Normal rhythm continued until June, 1927, when the pulse became irregular owing to sino-auricular block (Fig. 7), and a week later fibrillation (Fig. 8) again developed, the quinidine having been omitted for some days. Seven weeks later, when quinidine was resumed, normal rhythm (Fig. 9) was restored and has since been maintained in spite of an attack of bronchitis in the early part of this year.

This case is of particular interest, for the relapses have afforded repeated opportunities for comparing the general condition during fibrillation and sinus rhythm. The patient, who is an intelligent and observant man, is most emphatic about the relief which on each occasion has accompanied the restoration of the normal mechanism. There is a second reason why this case is worthy of notice. It is one in which we did not expect to obtain a successful result. An elderly man, the ventricular complex of whose electrocardiogram (Figs. 2–8) is strikingly abnormal, could hardly have been regarded as a favourable subject. In fact the only redeeming feature—and one to which hitherto we have probably not attached sufficient importance—was the absence of congestive heart failure. The success in this case tempts one to give quinidine a trial in some of the other "fibrotic" cases which hitherto we have passed over as unsuitable.

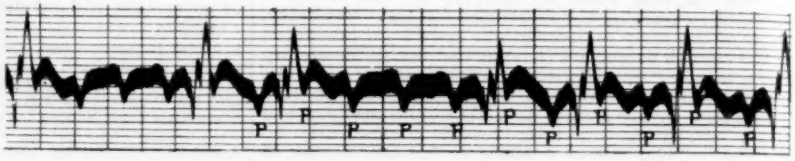
FIG. 3.



March 26th, 1923. Chest lead showing fibrillation.

CASE 7.—A mission secretary, aged 40, was admitted in February, 1926, with rheumatic carditis, congestive heart failure, and auricular fibrillation. His cardiac symptoms dated from an attack of chorea at the age of 11. Digitalis was given for four weeks, by which time all signs of failure had disappeared. A course of quinidine treatment was commenced on March 24th, and two days later, after 2·4 g. of the drug had been taken, the heart's action became regular, except for occasional extrasystoles. A week later the patient had acute pain in the region of the spleen, suggestive of infarction, and was slightly jaundiced. This quickly cleared up and did not upset the heart mechanism. The quinidine was reduced until 0·2 g. was being taken daily, and gr. 1/600 of Nativelle's digitalin every other day. This was continued until June, 1927. He was able to carry on his work till December, 1927, when attacks of palpitation and dyspnœa became troublesome on more than mild exertion. In February, 1928, he had to go to bed for two weeks on account of the dyspnœa, and has been in bed a few days since then. When last seen in June of this year the heart rhythm was normal and he was continuing to take 0·2 g. of quinidine daily.

FIG. 2.



(This figure and Figs. 3 to 8 all refer to Case 6.)
March 23rd, 1923. Chest lead after first course of quinidine showing pure flutter with varying 2 : 1, 4 : 1 block. P = auricular complex.

CASE 8.—A working-class woman, aged 26, whose cardiac lesion dated from an attack of rheumatic fever in childhood, developed auricular fibrillation during a subsequent rheumatic attack, following confinement. When first seen she had advanced mitral stenosis with enlargement of the liver. Normal rhythm was restored by 1·0 g. of quinidine in June, 1923, and maintained for over two years, despite the birth of a full-time child (fourth pregnancy). A fifth pregnancy, however, had to be terminated at three months, in September, 1925, owing to heart failure associated with the recurrence of fibrillation. Two short courses of quinidine at that time failed to restore normal rhythm. She was readmitted in July, 1926, and quinidine was again administered. The first course of 0·8 g. caused vomiting, but four days later 2·0 g. restored normal rhythm which was maintained for five months. In January, 1927, a further course of quinidine (4·8 g.) once more restored normal rhythm, and a daily holding dose of 0·4 g. was given. From January to the end of February, 1927, auricular fibrillation and flutter occurred in paroxysms, finally giving way to continued fibrillation which has persisted. Since reversion to fibrillation, 15 months ago, it has been possible efficiently to control the ventricular rate with digitalis. This patient is able to carry on her full household duties, though her exercise tolerance is not quite so good as it was during the first long spell of normal rhythm. Her heart is now greatly enlarged, and radiographic examination shows that the shadow of the left auricle forms part of the right border of the heart (Fig. 9). This case illustrates a sequence of events which one might reasonably anticipate when the cardiac lesion is progressive. After each relapse a larger dose of quinidine was required to restore normal rhythm, and the subsequent relapses tended to follow more quickly. In this case we had hopes of obtaining a permanently successful result, but were doomed to disappointment. The fact that normal rhythm was maintained throughout pregnancy and labour seemed most promising, but apparently the cardiac lesion was progressive and eventually got the upper hand.

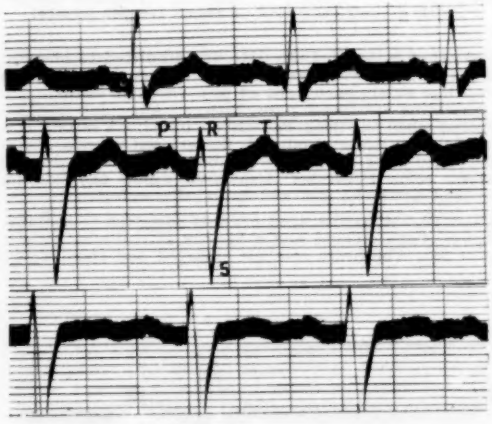
CASE 9.—A general labourer, aged 35, was admitted to hospital in August, 1923, with slight cardiac enlargement, auricular fibrillation, mitral stenosis, and aortic incompetence. He had been invalided out of the army with rheumatism seven years previously. His liver was enlarged and tender. Normal rhythm was restored after two courses of quinidine of 4·0 g. and 7·2 g. respectively, and maintained for a year with one relapse lasting 12 days. The second attack of fibrillation again produced epigastric tenderness. Normal rhythm was restored and maintained for two months with a relapse of two days. A third time normal rhythm was restored and held for six months, and a fourth time for eight months. After another relapse lasting ten days normal rhythm was again restored and held for six months. In all normal rhythm was maintained for three years, though there were six relapses of short duration, each accompanied by signs of cardiac failure and epigastric tenderness. After the sixth return to auricular fibrillation in September, 1926, quinidine failed to restore the normal

rhythm, in spite of five courses of treatment totalling 30 g. of the drug. In March, 1927, he was ill for three weeks at home and was then readmitted to hospital with embolic hemiplegia. In April he was discharged much improved, but still fibrillating, and was able to do light work until January, 1928, when he died after 36 hours' illness. The repeated relapses in this case appeared to be associated with emotional disturbances to which the patient was unduly susceptible.

Beneficial Effects.

In the majority of cases the restoration of normal rhythm seems to benefit the patient in two ways. He feels more comfortable—he is no longer conscious that he has a heart—and his tolerance for exercise is increased. Blumgart's [1] observations show that whereas digitalis is capable of controlling the resting ventricular rate in patients suffering from fibrillation, it fails to protect the ventricles from the exaggerated response to exercise, for, although the maximum rate attained on exertion is lower, the actual increase in rate is even greater than in the patient who has not taken digitalis. If this were the whole story, it would be easy to understand why the restoration of normal rhythm should increase the tolerance for exercise; but Blumgart goes on to point out that the heart in which normal rhythm has been restored by quinidine exhibits the same type of response to exercise as it did previously. If this be so, one is bound to conclude that the abnormal response to exercise is due, not to the abnormal rhythm but, to some other factor, probably the associated myocardial insufficiency. We cannot

FIG. 4.



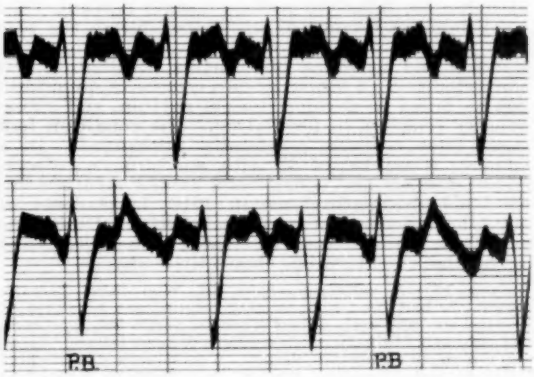
May 27th, 1924. Leads I, II, and III, showing sinus rhythm. The spreading, slurring, and large amplitude of the Q.R.S. complex is suggestive of impaired conductivity in the right branch of the auriculo-ventricular bundle. These features have remained practically unaltered during the five years that the patient has been under observation. The smaller amplitude of the deflexions in some of the later records is accounted for by the fact that these were taken at the standard sensitivity but with a lower magnification—i.e., with the camera closer to the galvanometer, so that an E.M.F. of 3 millivolts gives a deflexion of less than 30 mm.

express any opinion on this point, for we have not recorded the heart rate after exercise in our patients. But we have no hesitation in saying that, in the "successful" cases in our series, the patients have been able to lead a more active life than they could before the restoration of normal rhythm. Clark-Kennedy [3] came to the same conclusion. He stated that, in his series, sino-auricular (S.A.) rhythm raised the cardiac efficiency to a higher level than when auricular fibrillation was present, and the ventricular rate controlled by digitalis.

Group B.1. Complete Failures.

Tachycardia.—Of the eight cases in which quinidine failed to restore normal rhythm the treatment had to be abandoned on account of toxic symptoms in three instances. A woman of 31 (Case 10) with a rheumatic mitral stenosis and congestive heart failure, developed distressing palpitation on two occasions after a single dose of 0·2 g. The same was true of another woman (Case 11) who at the time showed no signs of heart

FIG. 5.



Dec. 5th, 1924, lead II. Both records show pure flutter with a 2:1 block. The irregularity in the lower record is due to the presence of frequent premature beats (P.B.), each of which is followed by a compensatory pause. This type of arrhythmia in which the flutter was complicated by premature beats of supra-ventricular origin was observed on three occasions in this patient during the transition from fibrillation to sinus rhythm.

failure. Both these patients subsequently died from cerebral embolism, the former three months and the latter three years after discharge from hospital.

Palpitation is a toxic symptom which has been noted by most workers, and may be sufficiently severe to render further treatment inadvisable. Levy [10] records two cases of heart failure which he considers were directly attributable to ventricular tachycardia. Parkinson and Nicholl [11] reported four cases in which signs of acute heart failure followed quinidine, but they suggest that this may have been due, not merely to the tachycardia but to a prejudicial effect of the drug on the myocardium. Frey [6] and others have reported instances of sudden, though only temporary, collapse with loss of consciousness and failure of respiration, and Clark-Kennedy [3] observed cerebral symptoms with partial or complete loss of consciousness in three of his cases.

In a man of 37 (Case 12), with no rheumatic history, treated in 1923, 13 g. of quinidine failed to restore normal rhythm and the drug had to be discontinued on account of headache and abdominal pain. This patient's condition does not appear to have become any worse, and for the past four years he has been able to carry on his work as a tinsmith.

Embolism.—In one of our early cases (Case 13), a woman of 46 with orthopnœa and œdema, cerebral embolism occurred shortly after the commencement of a course of quinidine treatment. The fact, however, that fibrillation was still present suggests that the quinidine may not have been any more to blame for this accident than for the similar catastrophe in the two cases in which the drug had been discontinued on account of palpitation. The only other case in our series in which embolism occurred while the drug was being given was Case 7, in which the resumption of normal rhythm probably was instrumental in producing splenic infarction, which, however, led to no serious results. Embolic phenomena are so common in old-standing cases of fibrillation, as is shown even in the present small series, that we are inclined to think that quinidine does not deserve all the blame it has received in this respect.

If the resumption of auricular contraction were responsible for dislodging a thrombus, one would

expect embolism to occur most frequently at the time, or at any rate very soon after the restoration of sinus rhythm; but experience does not bear this out. Viko, Marvin, and White [12] found that in 452 cases treated with quinidine the incidence of embolism was no higher than in 200 control cases in which it had not been given.

In a woman of 32 (Case 14) with cardiac enlargement and mitral stenosis but no œdema, three courses of quinidine failed to restore normal rhythm. Her condition has become slowly worse during the past four years. In a man of 36 (Case 15) with mitral stenosis and dyspnœa on exertion, fibrillation was converted to 2 : 1 flutter by two courses of quinidine; but he failed to develop normal rhythm, and subsequently relapsed to fibrillation. His condition four years later remains practically unchanged. In a labourer (Case 16) of 32 with aortic incompetence, mitral stenosis, and considerable cardiac enlargement, who had rheumatic fever in 1916, large doses of quinidine failed to restore normal rhythm. During the past three years he has been treated with digitalis and his cardiac condition has shown little change.

CASE 17.—A salesman, aged 33, who three months previously had been able to play tennis, was admitted to hospital in 1925 with mitral stenosis, aortic incompetence, and auricular fibrillation, but no signs of heart failure. There was a definite rheumatic history. Two courses of quinidine failed to restore normal rhythm, but digitalis sufficed to control the heart-rate and he was able to follow his occupation, which was not strenuous, until May, 1928, when he died after a short illness.

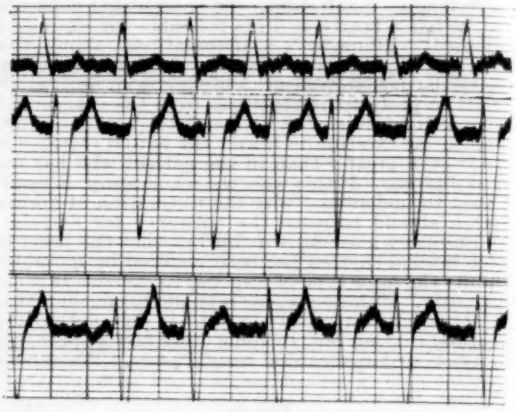
Ventricular Fibrillation.—Hay [8] in his series of 286 cases, which includes not only fibrillation but also flutter and paroxysmal tachycardia, records eight cases of sudden death which did not appear to be due to embolism. One of us has seen elsewhere a case in which it seemed probable that quinidine had caused sudden death by producing ventricular fibrillation. This, fortunately, is an extremely uncommon occurrence. Here again it is not possible to be certain that the drug has been responsible for the catastrophe, since ventricular fibrillation does occur spontaneously in patients who have never been treated with quinidine. An instance in point has recently been reported by one of us.[3] The patient was a man of 25, with old-standing rheumatic carditis, auricular fibrillation, and extreme dilatation of the left auricle. He was being treated by rest in bed with small doses of digitalis, and appeared to be making very satisfactory progress. Five days after admission to hospital, when using the bed-pan, suddenly and without warning he collapsed, and died within five minutes. Autopsy failed to reveal the cause of death. The general condition of this patient during the period he was in hospital was apparently so satisfactory that, if his sudden and unexpected collapse had followed the administration of quinidine, one would have been tempted to attribute it to the use of that drug. Since he never had quinidine, this contingency does not arise, but it leads one to question the validity of the evidence on which quinidine is sometimes blamed for bringing about a fatal issue in cases of auricular fibrillation in which no sufficient cause of death can be found post mortem.

Group B2. Relapses.

In the following cases the restoration of normal rhythm proved to be no more than a merely transient affair.

CASE 18.—A clog sole cutter, aged 42, who had had rheumatic fever in 1903, began to suffer from shortness of breath on exertion in April, 1921. He was admitted to hospital in February, 1922, with auricular fibrillation, but no evidence of cardiac enlargement nor of any valvular lesion. 2·4 g. of quinidine produced pure flutter. Auricular fibrillation recurred when the drug was discontinued. A second course of quinidine again produced flutter, but normal rhythm supervened after 4·6 g., and persisted for a fortnight. This patient refused further treatment since the quinidine provoked headache and abdominal discomfort.

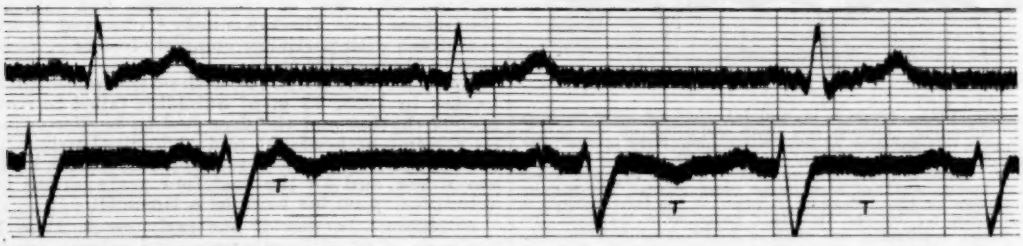
FIG. 7.



June 26th, 1927. Leads I, II, and III. Auricular fibrillation with a ventricular rate of about 140 per minute.

CASE 19.—A hatter, aged 58, was admitted to hospital in October, 1925. There was a history of rheumatism at the age of 38. The heart was not enlarged and there were no signs of cardiac failure, but he had auricular fibrillation and mitral stenosis. Six doses of quinidine sulphate totalling 2·4 g. restored normal rhythm. No holding dose was given. In this case it is not possible to say how long sinus rhythm was maintained as the patient was not seen till readmission to hospital a year later, when auricular fibrillation was present together with signs of cardiac failure. He improved with digitalis treatment, but on this occasion quinidine was not given. Since then he has been unable to work, partly on account of his cardiac disability, but chiefly because he is not mentally capable.

FIG. 6.



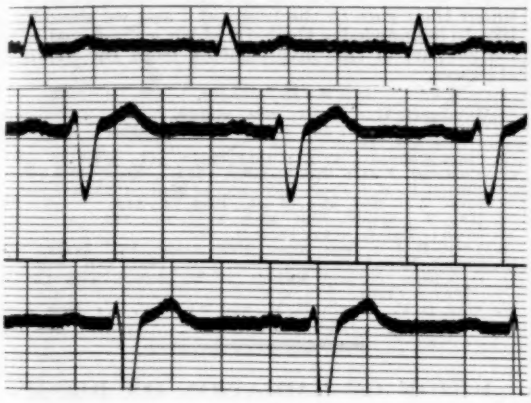
June 17th, 1927. Leads I and II, showing sino-auricular block. The irregularity in lead II is associated with variability in the form of the T-wave.

CASE 20.—A cotton overlooker, aged 37, was admitted to hospital with auricular fibrillation in February, 1926. There was a history of rheumatic fever at the age of 11, but there was no obvious valvular lesion and no cardiac enlargement. 3·0 g. of quinidine restored normal rhythm,

which only held for a week. A second course of quinidine was given and 2·0 g. again restored normal rhythm; this was maintained with a daily dose of 0·2 g. till his discharge on March 20th, when the fibrillation returned and has persisted to the present date. Since leaving hospital he has been able to follow his occupation, but during the past year he has found the work rather strenuous and has required to have periodic rests to relieve the palpitation, dyspnœa, and precordial pain which develop when he is tired.

CASE 21.—A clerk, aged 55, was admitted to hospital in October, 1924, complaining of palpitation and loss of mental

FIG. 8.



June 1st, 1928. Leads I, II, and III. Sinus rhythm.

concentration. Dizziness had been present for four months. As a child he had been subject to frequent "sore throats." On admission he was found to have mitral stenosis, auricular fibrillation, with slight enlargement and tenderness of the liver. Quinidine (0·4 g.) was administered twice daily from Oct. 7th to 9th, and sinus rhythm was restored after the third dose. The dose was reduced to 0·2 g. daily until the 23rd and was then reduced to 0·1 g. daily. The patient's transference to another ward on Oct. 27th coincided with reversion to fibrillation, but further treatment with 0·4 g. quinidine twice daily again restored normal rhythm after six doses. His condition improved considerably and he was allowed to go home on Nov. 5th. Fibrillation returned soon after discharge, but he was able to work for a short time. On Dec. 27th he developed an embolic hemiplegia and died a week later.

CASE 22.—A married woman, aged 48, was admitted in March, 1926, with pain in the lumbar region and dyspnœa of three years' duration. The heart was slightly enlarged to the left, but the sounds were good, and there was a soft apical systolic murmur. Apart from auricular fibrillation no other abnormal signs were present. Quinidine was given for four days without success. Five days later normal rhythm was restored after 2·8 g. of quinidine. A holding dose of 0·4 g. twice daily was given until discharge at the end of the month, and was ordered to be continued. The patient did not attend for further treatment, and fibrillation recurred soon after leaving hospital. Restoration of normal rhythm did not appear to benefit this woman, and she has continued in good health without further treatment. She was last seen in March, 1928, when the fibrillation was still present. The pulse-rate was 80, the first sound was blurred at the apex, but elsewhere both sounds were clear. There was no cardiac enlargement nor œdema. She was not having any treatment.

Group B3. Little or no Benefit from the Restoration of Normal Rhythm.

Four patients in whom the restoration of normal rhythm was unaccompanied by any obvious improvement in their general condition, all died within seven months of discharge from hospital. The one remaining patient in this group (Case 24) lived for 19 months.

CASE 23.—A machinist, aged 50, with old-standing rheumatic carditis and mitral stenosis became normal in June, 1926, after six doses of 0·4 g. of quinidine. A daily holding dose of 0·4 g. was given. On discharge from hospital she was able to resume her work, but in November, 1926, she had an attack of acute pleurisy. After this she rapidly lost ground and died in January, 1927.

CASE 24.—A married woman, aged 31, who had been short of breath for 15 years, and getting worse during the last 12 months, was admitted to hospital with mitral stenosis and auricular fibrillation. The heart was slightly enlarged, and the liver was just palpable. In April, 1925, 3·0 g. of quinidine were given without success. A second course of 4·0 g. four days later restored normal rhythm. Two weeks later she was allowed to get up, and felt much better. She was able to walk about without distress. In July there was a brief relapse to auricular fibrillation, in spite of a daily dose of quinidine. Normal rhythm returned, however, without increasing the dose and was maintained until the end of 1926, when she took a turn for the worse and died early in January, 1927.

This is a border-line case which might have been regarded as successful for a short period of time.

CASE 25.—In a woman, aged 29, who had suffered from dyspnœa for five years, 2·8 g. of quinidine restored the normal rhythm, but the patient refused further treatment owing to headache and nausea. Her heart was greatly enlarged, but there was no venous congestion nor œdema. Shortly afterwards the patient returned home and died within a few weeks.

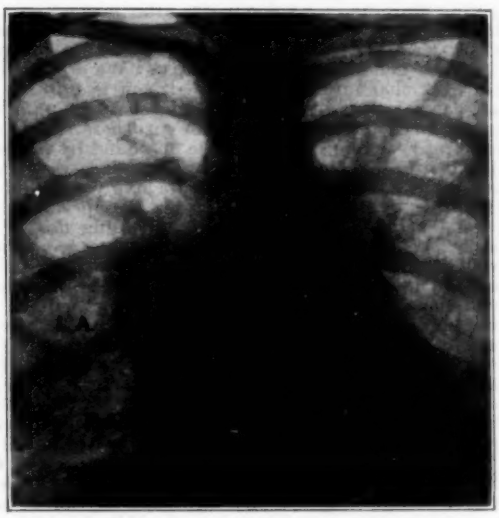
CASE 26.—A fruiterer, aged 26, with mitral stenosis and moderate cardiac enlargement, turned from auricular fibrillation into auricular flutter with 1·2 g. of quinidine. A further 1·6 g. restored the normal mechanism which persisted till death a month later.

CASE 27.—A mechanic, aged 42, was admitted in January, 1925, with chronic interstitial nephritis and auricular fibrillation. There was a six months' cardiac history. After three weeks' rest in bed and treatment with digitalis, quinidine was given. Three doses of 0·4 g. restored normal rhythm, and this was maintained. By the end of February all signs of cardiac failure had disappeared and he was able to walk about. He went home, still taking quinidine daily, but died seven weeks later from uræmia. The pulse remained regular to the end.

Paroxysmal Auricular Fibrillation.

We have made no reference in this paper to the use of quinidine in paroxysmal fibrillation. In conditions such as this, where the attacks occur at irregular

FIG. 9.



Radiogram of chest in Case 8. L.A. = Shadow of left auricle. R.A. = Shadow of right auricle.

intervals, vary in duration, and terminate spontaneously, it is exceedingly difficult to assess with any certainty the value of the therapeutic agents which have been employed. Parkinson and Nicholl [11] reported beneficial effects in three out of five cases under their care. As they say, one would naturally expect that a drug which can abolish established fibrillation would be likely to ward off, or at any rate to reduce the frequency of, attacks in the paroxysmal form of the disorder. We are inclined to think that

the reason why quinidine is not more uniformly successful in this type of case is that there are two distinct varieties of paroxysmal auricular fibrillation, the one a mere precursor of the established condition, the other a derangement of the cardiac mechanism, which shows little or no tendency to become permanent, and is more closely allied to true paroxysmal tachycardia. In one such case which we have now had under observation for six years, during which period attacks have occurred about once a fortnight, quinidine was given daily in varying doses for 12 months. It failed to produce any obvious effect, either on the duration or on the frequency of the attacks; but, since this case raises several issues which do not come within the scope of the present paper, we do not propose to refer to it in detail here.

Method of Administering Quinidine.

We have from time to time modified our technique in the administration of quinidine both as regards the total quantity given per diem and the interval between successive doses. The method which we now generally adopt is, first having got the patient fully digitalised, to give a preliminary dose of 0·2 g. of quinidine to exclude the possibility of an idiosyncrasy to the drug. Twenty-four hours later 0·4 g. is given in the form of a cachet, and this is repeated every two hours for five doses, or until normal rhythm returns. If necessary another five doses are given on each of the two succeeding days. Generally, however, sinus rhythm is restored on the first day.

The after-treatment of patients who respond to quinidine is a subject about which opinion is divided. Emanuel [4] stated that he had found no advantage in persevering with small doses of quinidine after sinus rhythm had once been established. Hay [7] expressed a similar opinion in his first paper, but in his report [8] of the collective experience of members of the Cardiac Club he states that the general opinion seems to be in favour of giving the drug for some time after the restoration of normal rhythm. Fraser [5] considers that it is probably advisable in all cases to continue giving quinidine for some weeks after normal rhythm has resulted, though in gradually decreasing doses. Clark-Kennedy [3] is of opinion that discontinuation of the drug generally leads to relapse. We are inclined to think that no one line of treatment is suitable for all cases. The tendency to relapse is much more pronounced in some cases than in others. The two extremes are represented on the one hand by patients like our Case 1, in which no holding dose was given and sinus rhythm has persisted for five years, and on the other by cases such as those in Group B2, which persistently relapse in spite of a holding dose. To carry the contrast a step further, there are people with healthy auricles which never have fibrillated, and are never likely to fibrillate, while there are others who have fibrillated for some time and will in all probability go on fibrillating for the rest of their lives, and in whom sinus rhythm cannot be restored. The former have no need for quinidine, while in the latter it achieves no result. There are, however, a large number of cases which lie between these two extremes. It is in them that after-treatment with quinidine is likely to hold the balance between fibrillation and normal rhythm and to prevent relapse. On this hypothesis we have based the routine treatment which we now employ. When normal rhythm is first restored we give no holding dose, for if it should prove unnecessary so much the better. When, however, the first relapse occurs we give a holding dose of 0·4 g. per diem for a month or six weeks, and half that dose for the next two or three months. In the event of a subsequent relapse the quinidine is continued indefinitely in such quantity as appears necessary to maintain sinus rhythm.

Summary.

In an unselected series of 27 hospital cases of auricular fibrillation, all of which were first treated with quinidine more than two years ago, definite and lasting benefit was obtained in nine instances. In 8 cases the drug failed to produce normal rhythm, and in the remaining 10 cases though fibrillation was arrested, either the restoration of the normal mechanism proved to be a merely transient event, or the patient derived no definite benefit therefrom. In 5 cases the ætiological factor appeared to be a chronic myocardial fibrosis, and in the remaining 22 the cardiac lesion was definitely or probably rheumatic.

Some of the dangers of quinidine therapy are considered and the method of administration is discussed.

We are indebted to the other members of the staff of the Manchester Royal Infirmary for permission to study and to follow up the after-histories of cases under their care in the hospital; and we should also like to acknowledge the help which we received in the earlier part of this investigation from Dr. Sylvia K. Hickson.

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ACTION OF RADIATION ON BLOOD-SUPPLY OF TUMOURS.

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So much attention has been paid to the direct action of radiation on tumour cells that its other effects on tumours have been neglected. Previous papers have brought forward experimental evidence to show that the action of radiation on blood-vessels and on blood-supply is very important, and that it will explain many experimental and clinical findings, besides giving a useful working hypothesis for therapy. In the present paper I insist once more on the importance of the effect on the blood-supply when irradiating living tissues or tumours. The difference between the exposure of tumours in vitro and in vivo has been dealt with.[1] When tumour cells are left in the body after exposure in vivo they suffer from the damaging effect of a lessened blood-supply as well as from the direct action of the radiation, and so are more easily destroyed than when removed at once and implanted into another animal, where they do not suffer from any disturbance of blood-supply. The dose of radiation can be adjusted so that the cells die when implanted four or five days after exposure, whereas they live when implanted at once. This difference was shown to be associated with an interference with the blood-supply occurring four to five days after exposure. Thus two actions of radiation were differentiated: (*a*) direct destructive action on the tumour cells, and (*b*) indirect damage from an interference with the blood-supply.

The experiments here described deal with the difference between the susceptibility of fast- and slow-growing tumours. Clinically, fast-growing tumours appear to be more susceptible than slow. Experiments were made in vitro to see whether this was true under experimental conditions. Four tumours were chosen: the fast-growing Jensen's rat sarcoma (J.R.S.), the slow-growing rat sarcoma No. 35, the fast-growing mouse carcinoma T/63, and the slow-growing mouse carcinoma "Twort." Pieces of tumour approximately 1 c.mm. in size were placed between sheets of mica 0·04 mm. thick and exposed to a radium applicator. The applicator used throughout these experiments was 110 mg. $RaBr_2 4H_2O$,

area 2×2 cm., screen 0·12 mm. silver. The pieces were then inoculated into the flanks of animals, control unradiated pieces being placed in the opposite flanks. The results are given in Table I.

The figures show that there is no decided difference in susceptibility between tumour cells from fast- and slow-growing tumours; the slow-growing tumours are a little more susceptible than the fast, the lethal doses being 30 as against 40 minutes for the sarcomas, and 25 as against 30 for the carcinomas. If, therefore, fast-growing tumours are clinically more susceptible the difference is not due to any difference in the susceptibility of the tumour cells. Similar results occur if the tumour cells are exposed in the living animal, removed immediately after exposure and tested in the same way.

FIG. 1.

FIG. 2.

Diameter of field = 0·93 mm. Stippled areas = tumour; black areas = blood-vessels; Fig. 1 = T/63; Fig. 2 = Twort; Fig. 3 = slow-growing sarcoma; Fig. 4 = J.R.S.

Fast-growing Tumours more Susceptible in Vivo.

Experiments in vivo were next carried out. Animals were inoculated in both flanks with pieces of tumour approximately a cubic millimetre in size. The resulting tumours were repeatedly measured, and when one of them had grown to 5×5 or 6×4 mm. of superficial area it was irradiated. The other tumour served as a control; its growth was watched and if it did not grow progressively the animal was discarded. Thus, by using only animals in which the control tumours grew progressively, all effects of immunity were avoided. The radiated tumours were measured thrice a week to see whether they disappeared or not. The results are given in Table II.

In contrast to the previous results a large difference in susceptibility is here seen; the fast-growing tumours are far more easily destroyed. Here the conditions of radiation are much more favourable for the survival of the tumour cells than in the experiments summarised in Table I. In the experiments in vitro the tumour material was only 1 mm. thick and was separated from the radium by only a thin sheet of mica, whereas in the experiments in vivo the tumours were approximately 5 mm. thick and separated from the radium by the skin and subcutaneous tissues. Other things being equal, the dose required to destroy the tumour cells should be much greater for the exposures in vivo. This holds good for the slow-growing tumours, the lethal dose being raised from 30 to 80 minutes for the sarcoma and from 25 to 50 minutes for the carcinoma. In the fast-growing tumours the difference is not seen; from this it may be argued that here some extra destructive action is added which is not present when slow-growing tumours are exposed in vivo. In the analysis of these results the comparison of the sarcomas with the carcinomas has been avoided. The differences seen are not sufficiently large to warrant any useful conclusions.

FIG. 3.

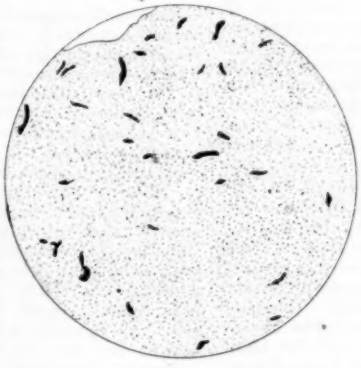
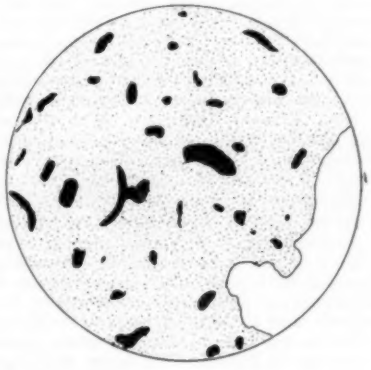


FIG. 4.



The Heightened Susceptibility due to Interference with Blood-supply.

The suggestion is that this extra destructive action, which operates more in the case of fast- than slow-growing tumours, is an interference with blood-supply, on which radiation is known to have a deleterious

TABLE I.—*Exposures in Vitro.*

Min. exp.	Sarcoma.		Carcinoma.		Min. exp.	Sarcoma.		Carcinoma.	
	F.-g.	S.-g.	F.-g.	S.-g.		F.-g.	S.-g.	F.-g.	S.-g.
15	—	5/6	—	8/8	35	7/10	—	0/8	0/4
20	4/4	4/4	10/10	4/6	40	1/17	0/4	0/8	—
25	3/4	10/12	5/12	1/20	45	0/7	—	—	—
30	5/12	1/10	1/8	0/4					

F.-g. = fast-growing. S.-g. = slow-growing.
Min. exp. = minutes exposure.

TABLE II.—*Exposures in Vivo.*

Min. exp.	Sarcoma.		Carcinoma.		Min. exp.	Sarcoma.		Carcinoma.	
	F.-g.	S.-g.	F.-g.	S.-g.		F.-g.	S.-g.	F.-g.	S.-g.
15	—	—	12/12	—	45	3/10	—	—	4/14
20	2/2	—	3/5	—	50	0/5	4/4	—	0/5
25	2/2	—	1/7	—	60	—	3/6	—	—
30	3/4	—	2/8	—	70	—	3/6	—	—
35	5/10	—	0/5	2/2	80	—	3/8	—	—
40	4/15	2/2	—	5/8	90	—	0/5	—	—

The denominator of each fraction indicates the number of animals used and the numerator the number which grew tumours. Only those animals which grew progressive tumours on the control side were included. Thus the effects of immunity were ruled out. With "J.R.S." and "Twort" concomitant immunity is common, so that very large numbers of animals had to be employed to obtain the data.

action. If we knew that the fast-growing tumours were living at the top of their blood-supply this explanation would suffice, and the fact that fast-growing tumours especially tend to undergo necrosis suggests that it is so. Further, the blood-supply of tumours, and especially of fast-growing undifferentiated tumours, is largely sinusoidal and therefore inefficient and likely to be interfered with easily.

Direct evidence is, however, available. The state of the blood-supply of tumours of mice can be seen through the thin skin during life after depilation of the hair. Progressively growing tumours are coloured rosy pink; pressure blanches this colour, which returns quickly when the pressure is released. After radiation a change becomes visible about the third day in tumours which are going to disappear; the colour changes to a deep purple, which is blanched with difficulty, and the return of which is delayed. Evidently the circulation is obstructed. Subsequently the tumour becomes gradually pale and bloodless, changing from purple through orange and yellow to a dirty white colour. During this period the tumour is decreasing in size. Microscopic examination of tumours confirms these observations.[1]

Now as these blood changes always accompany the disappearance of the tumours, it follows that the changes occur after smaller doses of radiation in the fast-growing tumours than in the slow. The question arises: Why do fast-growing tumours suffer a greater obstruction of their blood-supply than do slow-growing ones? Previous work [2 3] has shown that at least two factors are concerned—changes in the blood-vessels themselves and changes in the surrounding cells. Changes in the blood-vessels such as swelling of the endothelial cells must operate alike for both fast- and slow-growing tumours—and it is more likely that some difference outside the blood-vessels is the determining factor. By taking special precautions to preserve the blood content of tumours during removal and preparation the relationship between blood-supply and tumour cells can be well demonstrated. From such material the following drawings were made on squared paper, using a squared graticule in the eye-piece. These diagrams were chosen from a large number of specimens as representative of the average condition. They are here used only to help the description in the text and not as proof of the differences, which can only be obtained by examination of a large number of stained slides.

Comparing T/63 with Twort it is seen that in T/63 all the spaces between the blood-vessels are closely packed with cells, whereas in Twort connective tissue spaces, free of tumour cells, are to be seen. In other words, the masses of tumour cells around the blood-vessels are larger, deeper, and denser in T/63 than they are in Twort. The same holds good when J.R.S. and slow sarcoma are contrasted; the area of cells per blood-vessel is larger in J.R.S.

It is now possible to suggest why the blood-supply of fast-growing tumours, with cells abundantly and closely packed around the blood-vessels, is especially interfered with by radiation. I have shown [3] that the nuclei of cells swell to about three times their normal size (superficial area) on about the second or third day after irradiation. This increase in bulk must take place at the expense of and bring pressure to bear upon surrounding tissues and structures. Thus capillaries and veins will be pressed upon, and in fast-growing tumours where the intervascular spaces are closely packed with tumour cells this will take place to a greater extent than where the tumour cells are less closely packed, as in slow-growing tumours. According to these findings, therefore, the rate of growth is not primarily the determining factor; it is because closely packed cells are commonly found in fast-growing tumours that these are especially susceptible to irradiation.

The radium used in these researches was on loan from the Medical Research Council. I am indebted to Dr. J. A. Murray, of the Imperial Cancer Research Fund, for the supply of the tumours used in these researches.

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ADDISON'S ANÆMIA:

THE EFFECT OF TREATMENT ON THE INTESTINAL INFECTION.

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So many excellent ætiological reviews of Addison's anæmia have recently been published, notably those by Hurst,[1] Davidson,[2] and Davidson, M'Crie, and Gulland,[3] that very little repetition is necessary. For the purpose of this note it may be emphasised that consistently good results are being reported as a result of liver treatment and that all observers are now agreed upon the constant presence of complete achlorhydria and intense gastro-intestinal sepsis, particularly the development, by both descending and ascending infection, of a bacterial flora of fæcal type throughout the whole length of the small intestine. As Davidson remarks, if auto-intoxication does not occur in pernicious anæmia it can never occur at all. Any acceptable ætiological theory of the disease must recognise both these factors, and in recent times much attention has been devoted to their reconciliation. Below are recorded a few bacteriological observations, made before and after treatment, in the hope that they may, of themselves and from comparison with the work of others, prove helpful in clearing up this most difficult problem.

During the past four years I have, whenever opportunity occurred, examined the gastro-duodenal and fæcal bacteriology of proved cases of Addison's anæmia. The results obtained from 37 patients were published [3] in January, 1927, and, after comparing my own results with others available at that time, I suggested that the reason for complete failure on the part of so many workers to isolate a specific bacterium in Addison's anæmia arose from the fact that there is no specific organism, the toxins being products in general of the grossly fæcal flora which comes to occupy the small intestine. In the following year Davidson, after working on similar lines with 32 cases, suggested that it is unnecessary to state categorically whether the toxin is produced by one or all of the organisms present in such abnormal numbers and position, or even whether it is the result of bacterial action on the ingestion of food materials. This observer's detailed bacteriological results have just been published, and, after discussing them with him personally, I think I can safely say that our results agree in all essential particulars, except that I have recorded a somewhat higher incidence of hæmolytic strains of streptococci in the gastro-duodenal specimens, and of *Bacillus coli* in both the gastro-duodenal and fæcal specimens. The former discrepancy is probably explained by the fact that several of the cases in my series suffered from relatively acute oral and upper alimentary sepsis. I found hæmolytic streptococci in the fæces in one case only, but I have concluded from further experiments that the coliform strains do not produce a true, separable hæmolysin, but, as Davidson suggests, cause rapid hæmodigestion in blood media. Therefore my figures for the incidence of hæmolytic strains of *B. coli* were probably too high. I entirely agree with the general finding by many observers that the anaerobic bacteria, many of which are hæmolytic in normal people, are markedly increased in the fæces in Addison's anæmia. A review of all the bacteriological facts so far established shows that in most of the cases the only organisms which can produce a free hæmolysin and are present in sufficient numbers to elaborate in the intestine enough hæmolysin to allow its absorption in any quantity,

are the anaerobic strains, particularly those which would be classified as *B. welchii*. But there are several reasons for hesitation in accepting this organism as the specific cause of the anæmia. For example, it has been my experience as well as that of several other workers on the subject that, as I pointed out when recording my first series of cases, the anaerobic increase does not especially concern the hæmolytic strains. When these fæcal strains of *B. welchii* are isolated such extreme variations are found in the amount of hæmolysin they produce that it is impossible to conclude that an increase in the number of *B. welchii* spores in a fæcal specimen necessarily proves that the amount of free hæmolysin in the intestinal contents is raised in corresponding proportion. Several other reservations are carefully discussed by Davidson [4] in his most recent paper, and need not be detailed here. There is, I think, much to be said for his contention that bacterial hæmolysins are not necessarily of ætiological importance in the disease, and that it is the gastro-intestinal sepsis generally which produces a toxic effect on the liver and prevents it from providing sufficient of that substance which appears to be essential for the proper maturation of the megaloblasts.

Bacterial Content of the Fæces.

The particular concern of the present note is, however, the effect of treatment. Since my original series was published a few more cases have come under observation and, more important, it has been possible to examine some of the original patients after their return to normal. In the first place, the bacterial content of the fæces was estimated before and after successful treatment by high liver diet. Table I.

TABLE I.—*Cases of Addison's Anæmia treated with Liver.*

Case.	Before treatment. Hb. % 40–60.			After treatment. Hb. % 90–100.			Normals.		
	Highest dil. containing—		Ind. v.d.B.	Highest dil. containing—		Ind. v.d.B.	Highest dil. containing—		Ind. v.d.B.
	C.b.	B.w.		C.b.	B.w.		C.b.	B.w.	
1	1 in 10^7	1 in 10^7	+	1 in 10^7	1 in 10^7	−	1 in 10^3	1 in 10	—
2	1 „ 10^6	1 „ 10^6	+	1 „ 10^6	1 „ 10^5	+	1 „ 10^2	1 „ 10^2	—
3	1 „ 10^4	1 „ 10^5	+	1 „ 10^5	1 „ 10^5	−	1 „ 10	1 „ 10^4	—
4	1 „ 10^5	1 „ 10^5	+	1 „ 10^4	1 „ 10^7	+	1 „ 10^2	1 „ 10^2	—
5	1 „ 10^5	1 „ 10^4	+	1 „ 10^4	1 „ 10^5	−	1 „ 10^2	1 „ 10^2	—

Dil. = Dilution. C.b. = Coliform bacilli. B.w. = *Bacillus welchii*. Ind. v.d.B = Indirect van den Berg reaction.

shows typical results from five cases of Addison's anæmia when the hæmoglobin percentage stood at 40–60 per cent. and 90–100 per cent. respectively, and these are compared with the bacterial counts from five normals. The technique employed is essentially similar to that adopted by both Moench, Kahn and Torrey, and Davidson. The experiments were carried only so far as to estimate the number of living *B. welchii* spores and coliform bacilli as a group, not typical *B. coli communis* only; further refinements were considered unnecessary for the present purpose.

Fresh fæcal material was broken up in sterile normal saline in test-tubes of constant size and, after the coarse material had settled, a series of dilutions was prepared with saline, so that each was ten times weaker, until the final dilution represented 1 in 100,000,000 of the original suspension. All the original suspensions were made to match a standard opacity against the same light before the dilution series was commenced. For the detection of the highest dilution containing *B. welchii* spores, previously heated tubes of Robertson's cooked meat medium were used, 1 c.cm. of the various dilutions being added, and, after heating to 80° C. for 20 minutes the tubes were closed with one-inch caps of vaseline and paraffin and incubated at 37° C. for several days. From those tubes which showed the characteristic *B. welchii* reaction subcultures were made into litmus milk tubes similarly capped and incubated in order to obtain the characteristic clot. For the estimation of coliform bacilli plates of bile-salt agar were poured after adding 0·1 c.cm. of each suspension examined.

The figures in Table I. agree in the main with the quantitative estimations of bacteria in the fæces of untreated cases of Addison's anæmia which were made by the observers already quoted, but they also emphasise one very important ætiological point—namely, that the fæcal bacteriology is not altered as the result of liver treatment, and cases showing a return to a normal blood picture still retain their intestinal infection.

The results of the van den Bergh reaction applied to the serum are important in relation to the persistently high bacterial counts. In Cases 2 and 4 the originally positive indirect reaction remained, in spite of the relatively normal blood picture, and in Cases 1, 3, and 5 the reaction had quickly become completely negative after liver treatment was commenced and had remained negative up to the time that the bacterial counts were made. If the positive reaction be taken to represent active hæmolysis, then hæmolysis was still occurring in 2 and 4 but had ceased in the others. If the hæmolysis depends upon the amount of absorbable hæmolysin in the intestines, then one would have expected Cases 1, 3, and 5 to show a decided decrease in the intestinal infection, but this was not seen. The disappearance of the positive van den Bergh reaction does not necessarily appear to correspond with a period of reduced intestinal infection.

One would not, I think, expect liver taken by the mouth to influence directly any intestinal infection present, and that it cannot do so is suggested by the result of an experiment which I have carried out several times with slight modifications. Various liver preparations were incorporated in quantities varying from 0·2 to 2 per cent. in the usual agar and broth media used in routine bacteriological examination of fæces, control cultures being made in the same medium free from liver. No indication could be obtained that liver extract or digested liver had any appreciable influence upon the number of organisms growing in fæcal cultures.

It seems safe to assume, therefore, that liver treatment has no direct influence on the intestinal infection which all observers agree exists in Addison's anæmia. On the other hand it is possible to reduce to some extent the concentration of bacteria in the intestines by systematic attack upon all the factors which give rise to and maintain this infection—e.g., bucco-pharyngeal and dental sepsis and achlorhydria. In support of this it may be of interest to mention the findings in two cases of Addison's anæmia which came under observation early in 1924, before the introduction of treatment by high liver diet, in whom

TABLE II.—*Addison's Anæmia treated without Liver.*

No.	Before treatment. Hb. 40–60 %.		After treatment. Hb. 80–100 %.	
	Highest dil. containing *B. coli*.	Relative proportion of streptococcus to coliform.	Highest dil. containing *B. coli*.	Relative proportion of streptococcus to coliform.
1	1 in 10^4	1 to 20	1 in 10^2	1 to 75
2	1 „ 10^3	1 „ 15	1 „ 10^2	1 „ 65

systematic eradication of septic foci, administration of dilute hydrochloric acid by the mouth, and a long course of *B. acidophilus* milk produced gradual recovery to a normal blood picture, which has been maintained. At that time only quantitative examinations of the total number of coliform bacilli in the fæces and the relative number of streptococci to coliform organisms on plates were made. In both cases the bacterial counts were noted to fall quite definitely. It is unfortunate that anaerobic counts were not also made. The evidence of only two cases is, of course,

inconclusive, particularly in such a disease as Addison's anæmia. Whatever reduction in intestinal infection occurred, however, was evidently due to direct attack on the septic factor in the disease.

That this septic factor may be present without producing actual anæmia is clear from the figures in Table III., which records the fæcal bacteriology in three other cases of complete achlorhydria.

TABLE III.—*Cases of Complete Achlorhydria without Anæmia.*

No.	Highest dil. containing coliform bacilli.	Highest dil. containing *B. welchii*.	V. d. Bergh reaction.
1	1 in 10^4	1 in 10^7	—
2	1 „ 10^4	1 „ 10^8	—
3	1 „ 10^4	1 „ 10^8	—

In each of these cases the gastric germicidal barrier was entirely absent, as is seen from the high counts of the organisms in the fæces, but the blood picture was quite normal. In short, the intensity of the intestinal toxæmia must evidently exceed a certain level before anæmia begins to develop, which is a good reason for attempting, in those cases which are anæmic, to reduce the intestinal infection by direct means, in spite of the fact that they may, as far as the blood picture is concerned, show a good response to liver treatment.

The cases in Table I. have retained their high bacterial counts in the fæces throughout an apparently successful course of liver diet. In the past it was common to produce prolonged remissions of the anæmia simply by reducing the intestinal infection and improving the patient's general condition. It is, then, but a short step to the suggestion that Addison's anæmia may be influenced in two entirely different ways, because there are two distinct factors concerned. The bacteriological facts seem to be entirely in accord with the theory that liver treatment promotes regeneration of normal blood cells from the flagging bone-marrow, and presumably augments the supply of some marrow-activating liver-derived substance normally present in the circulation. If sufficient regenerative response is obtained the influence of the intestinal toxæmia may be entirely overshadowed. On the other hand, in a certain number of cases where the bone-marrow is not too exhausted to recover of itself, a small reduction in the intestinal toxæmia may just sway the balance sufficiently to allow the regenerative phase to be established. In short, in Addison's anæmia we may have a relatively delicate balance between the natural reproductive powers of the bone-marrow (which are in turn dependent upon an adequate supply of liver substance) and a toxæmia. It is possible to produce a normal blood picture in nearly all cases by stimulating the former by liver treatment, and in a smaller number, perhaps those of shorter history, by reducing the intestinal infection sufficiently to allow the bone-marrow to recover.

Recent clinical reports all agree that the nervous lesions in patients showing signs of subacute combined degeneration of the cord appear to be uninfluenced by liver treatment. That the bacterial content of their fæces is high, whether they are anæmic or not, can readily be demonstrated. For example, Case 5 in Table I. and Case 1 in Table III. are brothers, both with complete achlorhydria. The first showed a hæmoglobin percentage of 30 with a typical blood picture of Addison's anæmia; the second had definite signs of subacute combined degeneration of the cord, but his blood picture was absolutely normal. Liver treatment was entirely successful in the former, his hæmoglobin rising steadily to 90 per cent., but was without effect upon the nervous symptoms of the latter who, however, showed signs of improvement under systematic direct attack upon his alimentary sepsis. From cases of subacute combined degeneration of the cord under his care, Dr. Hurst has been kind enough to show me several instances in which progress of the cord lesions has been arrested in this way and others in which undeniable improvement has occurred. Evidently it is possible, by reducing the intestinal bacteria, to influence favourably the cord lesions as well as to relieve to some extent the exhaustion of the bone-marrow, but liver treatment is effective for the latter purpose only. Therefore in all cases showing signs of cord involvement it is especially important to attack the septic element directly, as well as instituting liver treatment if anæmia is present.

Conclusions.

Evidence is given that liver treatment does not influence the intensity or the nature of the intestinal infection in Addison's anæmia, that the disappearance of the positive indirect van den Bergh reaction does not necessarily correspond with a reduction in the intestinal infection, and that cases in which return to a normal blood picture has occurred may still show just as high a bacterial content in the fæces as when in the acutely anæmic stage.

To prevent remissions, therefore, the necessity of treating the alimentary sepsis directly as well as administering liver is emphasised, and some bearings of the bacteriological facts upon the possible ætiology of the disease are briefly discussed.

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Clinical and Laboratory Notes.

THE ADRENALIN TEST FOR THYROTOXICOSIS

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GROSS deviations of thyroid function in the direction, on the one hand, of hyperactivity with the possibility of perversion, and on the other of insufficiency have long been recognised. Both cretinism and exophthalmic goitre were noticed before 1840; myxœdema was described by Sir William Gull, of Guy's, in 1873, and shortly afterwards named by Ord, of St. Thomas's, and cachexia strumipriva was defined by Kocher in 1882. Lesser degrees of thyroid perversion, however, were not recognised until recently, and even now are frequently overlooked. The well-known signs are increased basal metabolism; tachycardia; thyroid enlargement; vasomotor disturbances, pallor alternating with periods of flushing and free perspiration, feeling of heat, mental acuity, perhaps irritability or delirium; tremulousness, especially in the outstretched hands; diarrhœa; glycosuria and lowered sugar tolerance; low blood pressure; vomiting; sleeplessness; loss of weight; pigmentation, and exophthalmos, all of which are only present in cases of very toxic exophthalmic goitre. In less toxic cases, and especially in other varieties of thyrotoxicosis, these may be present in part only or may be only evoked by arduous exertion, some intercurrent disease, or an emotional shock. The basal metabolic index may serve to distinguish incipient cases of thyrotoxicosis, but basal metabolism estimations have certain disadvantages, the chief of which is the wide limits of error in making the estimation, the result being appreciably affected by the nervousness of the patient. Other disadvantages are discomfort to the patient, whose exogenous metabolism must be reduced to a minimum by starvation, and the expense of the necessary apparatus. To avoid these difficulties search was made for a clinical test which would be simple, safe, and easy to perform, and since the sympathetic nervous system in thyrotoxic patients is hypersensitive to adrenalin,

TABLE I.—ADRENALIN REACTIONS IN GOITRE CASES.

No.	Sex.	Age.	Type of goitre.	Pulse-rates.			Blood pressure mm. Hg.			Result.	Remarks.
				Mean before adrenalin.	Mean after adrenalin.	Increase or decrease.	Mean before.	Mean after.	Increase or decrease.		
1	F.	53	Exophthalmic.	131	170	+39	137·5	163	+25·5	Positive.	Tremors appeared, epigastric pulsation and transient auricular fibrillation.
2	M.	49	Cyst in left lobe. Mild hyperthyroidism.	93	84	−9	120	106	−14	Negative	—
3	F.	19	Endemic goitre. Scabbard trachea. Mild thyrotoxicosis.	79·3	112	+33·3	111	126	+15	Positive.	Felt her heart beating.
4	F.	48	Suppurative thyroiditis. Thyrotoxicosis.	132	160	+28	138	139·6	+ 1·6	Positive atypical.	Tremors developed. Extrasystoles noted.
5	F.	33	Multiple adenomata. Mild thyrotoxicosis.	81	111	+30	133	132	− 1	Positive atypical.	Tremors elicited.
6	F.	29	Graves's disease.	120	160	+40	117	148	+31	Positive.	Felt hot. Tremors became coarser.
7	F.	26	Adeno-parenchymatous.	86	111	+25	128·5	131·5	+ 3	Positive atypical.	—
8	F.	43	Adeno-parenchymatous. Toxic.	103	121	+18	123	128	+ 5	Positive atypical.	Felt heart palpitating. Tremors elicited.
9	F.	44	Multiple adenomata. Toxic.	91	114	+23	168	189	+21	Positive.	Pulsation of carotids became visible.
10	F.	17	Multiple fœtal adenomata.	80	90	+10	93·5	95·6	+ 2·1	Negative	—
11	F.	44	Adeno-parenchymatous. Mildly toxic.	100	105	+ 5	127·5	136·5	+ 9	Positive.	Fine tremors appeared in outstretched hands.
12	F.	63	Adeno-parenchymatous. Toxic.	100	130·5	+30·5	144·5	165	+20·5	Positive.	Tremors appeared. Perspiring freely. Pulsation of jugulars noted.
13	F.	28	Fœtal adenoma (right lobe). Breaking down in centre.	71·2	84·4	+13·2	97·4	109·9	+12·5	Positive.	—
14	F.	47	Multiple adenomata.	76·8	82	+ 5·2	114·4	120	+ 5·6	Positive.	—
15	F.	58	Multiple adenomata. Old standing (?). Early malignant change.	82·4	75·6	− 6·8	123·4	119·8	− 3·6	Negative	—
16	F.	20	Exophthalmic.	121·6	149	+27·4	113·6	160·4	+46·8	Positive.	Tremors became coarser; felt heart palpitating; became anxious.
17	M.	25	Exophthalmic.	101	106·8	+ 5·8	132	141·8	+ 9·8	Positive atypical.	—*
18	F.	18	Adeno-parenchymatous. Very mildly toxic.	91	94	+ 3	116·5	116·6	+ 0·1	—	No tremors. No subjective symptoms.
19	F.	26	Adenomatous (left lobe)	87	87	..	121	113	− 8	—	Coarse tremor in left hand. No subjective symptoms.
20	F.	19	Adeno-parenchymatous.	95	104	+ 9	123	120	− 3	—	—

* Ten minutes after injection præcordial and carotid pulsation present, and tremor in right hand somewhat exaggerated. Very marked exophthalmos, but cardiovascular features in abeyance. While under observation, pulse was not above 110 at any time.

the adrenalin reaction introduced by Emil Goetsch was tried and in a slightly modified form was found to be very effective.

The Adrenalin Test.

In 1916 Levy [1] showed that in cats an injection of adrenalin raised the systolic blood pressure very considerably if the cervical sympathetic were stimulated at the same time, whereas when this nerve was not stimulated the rise was not nearly so great. The rise did not occur if the thyroid had been previously extirpated, and it was concluded therefore that the secretion of this gland sensitised the sympathetic to the effect of adrenalin. In man many of the signs and symptoms of thyrotoxicosis can be exaggerated in a frank case or rendered apparent in an incipient one by adrenalin injections.

Goetsch,[2] of Long Island College Hospital, Brooklyn, applied these facts clinically, and in 1918 described an adrenalin test, the result of which is regarded as positive if, after subcutaneously injecting 0·5 c.cm. of fresh 1 in 1000 solution of adrenalin hydrochloride, a rise in the pulse-rate of 20 or more beats and in the systolic blood pressure of from 10 to 50 mm. of mercury occurs within five minutes of the injection. Various degrees of positivity occur.

The Adrenalin Test of Goetsch, Slightly Modified.—The test has been performed in a slightly modified form from that originally introduced by Goetsch, and is carried out as follows:—

The patient, who is resting quietly in bed, has the test explained to her and is assured that there will be neither danger nor pain. The pulse-rate and systolic blood pressure are taken at short intervals until constant, and a mean is obtained. 0·5 c.cm. of a 1 in 1000 solution in normal saline of fresh adrenalin hydrochloride is then injected subcutaneously over the deltoid, and a further series of readings are taken up till 15 minutes later; at the

TABLE II.—*Adrenalin Reactions in Healthy Subjects.*

No.	Sex.	Age.	Pulse-rates.			Blood pressure (mm. mercury).			Result.
			Mean before adrenalin.	Mean after adrenalin.	Increase or decrease.	Mean before.	Mean after.	Increase or decrease.	
1	M.	52	88	80	− 6	131·6	125	− 6·6	Neg.
2	M.	20	75	69	− 6	112·5	108	− 4·5	,,
3	M.	23	72·6	75	+ 2·4	130	127·5	− 2·5	,,
4	M.	19	65·3	85	+19·7	122·6	133·5	+10·9	Sl.-pos.*
5	M.	21	81	89	+ 8	128·5	131	+ 2·5	Neg.
6	M.	21	77	83	+ 6	130·5	126·5	− 4	,,
7	F.	23	93	94	+ 1	109	108	− 1	,,
8	F.	23	97	95	− 2	116	110·5	− 5·5	,,
9	F.	24	89	88	− 1	117	111·5	− 5·5	,,
10	F.	20	93·5	100	+ 6·5	120	122	+ 2	,,

* Sl. pos. = slightly positive.

There was clinical evidence of slight thyroidism. Subjects 5, 7, 9, and 10 felt heart beating about five minutes after the injection, and 7 developed a slight tremor.

[1] Levy, R. L.: Amer. Jour. Physiol., 1916, xli., 492.

[2] Goetsch, Emil: Newer Methods in the Diagnosis of Thyroid Disorders, Pathological and Clinical, Clifton Med. Bull., 1918; Endocrinology, 1920, iv., 389; New York State Med. Jour., 1918, xviii., 259.

same time signs and symptoms are noted, since these may be evoked or exaggerated.

Tables I. and II. show the result of this test applied to a series of goitre cases and to a series of healthy students who volunteered for the purpose. It will be seen that in healthy subjects there is little or no response.

Objections to the adrenalin test have been raised, but most observers agree that when it is negative the patient is in all probability not suffering from thyrotoxicosis. In our experience a markedly positive result indicates definite thyrotoxicosis. The atypical results are more difficult of interpretation, but it has been found that where the reaction to the adrenalin test is severe, the reaction to operation on the thyroid is also severe. Hence the extent of the reaction to adrenalin gives an indication of the degree of post-operative thyroidism to be expected.

The value of the adrenalin test carried out according to the technique described may be summarised as follows: 1. It reveals the presence of incipient thyroidism. 2. It provides a rough estimation of (*a*) the degree of thyroid intoxication, and (*b*) the extent of the reaction which is liable to follow operation on the thyroid. 3. If the reaction is absent or negative, the goitre is not toxic, and there will be no post-operative reaction.

A NOTE ON
ATYPICAL OR MILD ENTERIC.

By Eustace Thorp, O.B.E., M.B. Belf., D.P.H.,
DEPUTY MEDICAL OFFICER OF HEALTH FOR SUNDERLAND.

Some months ago I reported [1] some curious cases that appeared to be of enteric nature, observed over about a year amongst so-called pneumonias and in small groups. One or two in each group gave a positive Widal to typhoid or paratyphoid B; the remainder were negative though clinically mild enterics, and their chief characteristic was a febrile attack of from 10 to 17 days' duration. On the return of the temperature to normal rose spots made their appearance and clinically the cases were diagnosed as enteric or paratyphoid B as the case might be. By the time the spots appeared the patient as a rule seemed to be convalescent. Blood tests were taken and in about one case in five came back positive in dilution of 1/50 aud 1/125, the remainder being negative. The blood of other patients whose condition had been confidently diagnosed as enteric was examined with much the same results. I then tried repeated Widal reactions and had the satisfaction of finding that, like the rash, the reaction appeared to be delayed, positive results being obtained as late as the thirty-ninth day when the patient was quite well and would in the ordinary way have been discharged from hospital had we relied upon the Widal test to exclude enteric.

These cases were sent in as "pneumonia" or "observation pyrexia," and inquiry would frequently demonstrate a previous case of pneumonia with which the patient had been in contact. Usually there were few signs in the lungs, but the pyrexia had remained present rather long. It subsided shortly after admission and the patients were able to get up. Then it was found that they showed typical lenticular rose-pink spots which led to investigation of the blood. Much has been said lately about the laboratory being a bad master, and I think the above cases show that clinical evidence of enteric is essential and that a negative Widal does not exclude the disease, particularly in the mild forms.

Cases in my series have alternated, suggesting a vacillation in the presence of the reaction. To-day, I am afraid, the clinical diagnosis of enteric is often washed out on a single negative Widal. I suggest that it is cases such as the above that keep enteric going as much as the suspected but often untraceable "carrier," and if so the mystery of the sporadic case may not always be so elusive. The Widal seems to have but a small margin of error in well-marked clinical cases, but mine show that the margin of error in very mild cases is much greater and that laboratory confirmation involves several tests.

I publish these notes principally to correct a fallacy perpetuated in text-books that there is little error in Widal reactions. To-day this applies, I feel sure, only to the well-marked clinical case. In the mild forms of the disease the reaction is often delayed, and many cases like those I have described do undoubtedly exist. I have always suspected that these mild infections could be found among the "pneumonia" notifications at periods when sporadic cases were appearing and that they are missed both inside and outside hospital. On watching them the spots were found to appear during apparent convalescence; the Widal test was negative and the patients were discharged. Later they were detained and further Widal tests proved positive. All the cases were easily diagnosed clinically as enteric or paratyphoid before the first Widal test was made.

[1] THE LANCET, 1928, i., 371.

NOTE ON THE
TREATMENT OF ASTHMA IN CHILDREN WITH TUBERCULIN.

By T. M. Ling, B.M. Oxf.,
JOHN AND TEMPLE RESEARCH FELLOW IN DISEASES OF CHILDREN, ST. THOMAS'S HOSPITAL.

Within the last few years considerable interest has been reawakened in the treatment of asthma with small doses of tuberculin, the credit for this being due primarily to W. S. van Leeuwen, of Leiden.

In 1897 Bussenius [1] obtained encouraging results with tuberculin treatment in a patient suffering from asthma and pulmonary tuberculosis, and in 1913 Frankfurther [2] published seven cases of asthma treated in a similar way, all of whom did well. Since then Bouveyron,[3] Bonnamour and Duquaire [4] in France, and Nelson [5] in England have shown promising results. Van Leeuwen,[6] working with a large series, claims that about 50 per cent. are almost completely cured, about 25 per cent. are improved, and 25 per cent. are uninfluenced. Most of the patients so treated have been adults and therefore it was considered to be of interest to try the effect of this treatment on children. Twenty-four asthmatic cases were therefore chosen from the children's out-patient department at St. Thomas's Hospital, all of whom had been receiving treatment for not less than two years, while many of them had had symptoms for a considerably longer time. The treatment that had been given previously was potassium iodide by the mouth and injections of adrenalin during the attacks, while any source of infection in the mouth or naso-pharynx had been eradicated.

As a preliminary measure all the cases were examined clinically and radiologically to exclude as far as possible pulmonary fibrosis and enlarged mediastinal glands. Some of the French literature recently has suggested an association between congenital syphilis and asthma and consequently all the cases were examined with this point in view; no suggestive clinical signs were found and the Wassermann reaction was negative in every case. The average age of the patients was 7·5 years.

Cutaneous Pirquet reactions were done in all cases and 45 per cent. gave definitely positive reactions. Quite recently Baagoë [7] published the results of the test on a much larger series of asthmatic children, and found that only 32 per cent. gave positive reactions. The treatment appeared equally efficacious, whether the cutaneous reaction was positive or negative.

Method of Treatment.

In all cases Old Tuberculin (Burroughs Wellcome and Co.) was used and injections were given subcutaneously once a week. As the children were out-patients, it was not feasible to see each case on the day following the injection, but the mothers were instructed to note any general or local reaction that occurred; 385 injections were given and a general reaction was noted in two cases, while a history of a definite local reaction was given in five cases.

The usual procedure was to start injections with 0·1 c.cm. of a dilution of 1 in 1,000,000 and increase the dose on each occasion by 0·1 c.cm. or 0·2 c.cm. until 0·1 c.cm. of a 1 in 100,000 dilution was reached. Beyond this the dose was increased very gradually until the optimum quantity was found for each individual case. When once the correct quantity is obtained, it is not advisable to increase the strength of the injection as an attack of asthma is liable to be brought on. On two occasions this occurred within an hour of the injection, where the strength had been increased unduly quickly.

Two separate courses of treatment have been given with an interval of two months. Naturally the individual attendances were sometimes irregular, but for the whole group it was excellent, and the willingness and enthusiasm with which the mothers brought up the children week after week is probably the best indication of the efficacy of the treatment, particularly as each injection necessitates a certain amount of pain for the child. The average number of injections in the first course was 15 and in the second 10; thus it can be seen that the treatment takes a considerable time.

Results.

Of the original 24 cases, three were unaffected by the treatment and were discharged, while two discontinued treatment as they left the district. The remaining 19 had regular treatment, with occasional weekly lapses owing to intercurrent illness, and are all improved. The word "cure" admittedly should be used with greater caution than usual in asthma and only two cases could be included under this heading. The remaining 15 cases remained practically free from symptoms while under treatment, but lapsed to a varying degree between the courses and since treatment was discontinued. In asthma the patient's symptoms are the only index of the severity of an attack, and in every one of these cases the mother was emphatic that the attacks were much less severe and less prolonged than previous to treatment. A careful record was made in each case of the average interval of freedom from attacks previous to treatment and subsequent to the latter this interval has been increased by approximately 30 per cent.

Conclusions.

Admittedly the results are not striking and do not harmonise with van Leeuwen's claims that 50 per cent. of cases are curable by this means. On the other hand, it is justifiable to state that the frequency and the intensity of the asthmatic attacks can be diminished and this in itself is a justification for a more extended trial and for the inclusion of tuberculin among the methods of treatment of the established disease.

I am indebted to Dr. R. C. Jewesbury for permission to publish these cases.

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JOINT TUBERCULOSIS COUNCIL.—At a meeting of the Council, held on Oct. 17th, Dr. H. G. Sutherland reported on the recent International Tuberculosis Conference at Rome. Some of the posters exhibited there were, he thought, too terrifying to achieve useful purpose. Dr. G. Lissant Cox presented a statistical study on The Fate of Young Children in Tuberculous Households, dealing with a total of 1023 children up to 5 years, the figures being controlled by standard modern statistical methods. This study revealed that the number of deaths from non-pulmonary tuberculosis in young children exposed to infection from pulmonary cases was some ten times as great as that of the controls.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

SECTION OF OTOLOGY.

Mr. SOMERVILLE HASTINGS took the chair at a meeting of this Section on Nov. 2nd, and delivered a Presidential address on the

Estimation of Hearing Capacity.

Reviewing the progress of otology during the last 25 or 30 years he could not help feeling, he said, that our comparative ignorance of the pathology and treatment of so many cases of deafness of both the middle and internal ear types was partly due to the methods of examination used in the past. The hearing capacity, judged by the distance at which a whisper, the conversational voice, a watch, or Politzer's acoumeter could be heard, though of value clinically, were quite useless for scientific purposes. It was necessary at least to have a relatively pure sound such as that produced by a tuning-fork or a wireless valve; in the audiometer shown to the Section by W. S. Tucker and himself in 1923 the source of sound was a wireless valve, but the estimation of hearing was by means of purely arbitrary units. Harvey Fletcher estimated hearing capacity in what he called sensation units, such a unit being the minimal change in the intensity of a sound perceptible to the normal ear, but this did not go very far. What the speaker wanted to know before he could form a correct mental picture of a given case of deafness was, for every pure note between the upper and lower limits of audition, the percentage of normal hearing that remained. If it was also possible to estimate in percentages the degree to which the cochlear nerves and cerebral centres were functioning, the observer could say exactly to what extent the deafness was due to changes in the conducting apparatus and to what extent in the perceptive. Supposing, for example, it was found that a patient had 25 per cent. normal hearing when tested by air conduction, and say 50 per cent. normal hearing when his perceptive function was tested, then it could be said that he had only $\frac{25}{50}=50$ per cent. of normal hearing by conduction, or, in other words, that owing to impairment of the conduction of sound waves only 50 per cent. of the waves passing through the external and middle ear of a normal individual and reaching the cochlea were able to pass through his.

The President was convinced that for scientific study of deafness it was essential to give up arbitrary units of hearing and try to discover what percentage of the normal power of conduction and what percentage of the normal power of perception were present for pure sounds of the principal wave-lengths. That was the problem to be solved, and it was not an easy one.

He proposed to consider first the principles involved in estimating the perceptive function. It must be evident that the ordinary method of estimating bone conduction by means of a vibrating tuning-fork placed upon the mastoid was open to a thousand fallacies, since the more complete the interference with conduction through changes in the external or middle ear the longer would the sound of the tuning-fork be heard. In November, 1917, a committee of the Section formed to organise otological research had issued a report whose most useful recommendations, he thought, were those concerning hearing tests. Coming at a time of great national stress, the report had not received the attention it deserved. One of the tests therein recommended was that described as "absolute bone conduction." To carry out this test the observer (who presumably had normal hearing) and the patient each blocked his external auditory meatus with his finger, preferably by pressure on the tragus. A vibrating tuning-fork was then alternately pressed on to the mastoids of the patient and observer until it was no longer heard, and in this way the bone

conduction of the two persons was compared. Ever since the publication of the report the speaker had made use of this test in every case of deafness that he had at all carefully investigated, but so far he had never found absolute bone conduction increased above the normal. The oft-repeated statement that in otosclerosis bone conduction was increased was therefore untrue if it was applied to absolute bone conduction. If the comparison between the bone conduction of the patient and observer, with the meatus unblocked, was referred to, then admittedly in so-called otosclerosis bone conduction was increased. But so it was in all other forms of conductive deafness, whatever injury or disease of the external or middle ears was their cause. Indeed the increase of bone conduction as thus tested in the most advanced case of otosclerosis conceivable could not be greater than it was when a normal ear was thoroughly obstructed by a plug of wax.

Obstruction of the meatus in the absolute bone conduction test increased the perception by bone conduction very considerably. Therefore, if the degree of perceptive hearing (bone conduction) in the two ears was approximately equal, however great the degree of conductive deafness in the ear not being examined, the test would not be vitiated by it. Difficulties would only arise where there was marked perceptive deafness on the side being tested, with good cochlea hearing and considerable conductive deafness on the other side—an unusual combination. In such cases the patient would usually say at once that he was hearing the tuning-fork in the opposite ear, and it would be easy to exclude the ear not being tested, either by means of a noise machine (Bárány's box), or by rapid movement of the finger in the meatus. Lowndes Yates, T. A. Clarke, and others had shown that the total hearing (perceptive and conductive) power of a patient for C2 and other tones could be estimated as follows :—

A tuning-fork is held at any constant distance from the patient's ear. When he ceases to hear it it is transferred to a similar distance from the ear of an observer who has normal hearing, and the time noted until it becomes inaudible. This gives the deficiency in seconds of the patient for the note in question. By means of a table or graph this can be converted into percentage retention of " normal hearing distance," and seeing that the intensity of sound varies inversely as the square of the distance from its source, the square root of this figure gives the percentage of total hearing power present.

By means of the absolute bone conduction (A.B.C.) test it was possible to estimate the percentage of normal perceptive (cochlea) hearing retained by a patient. A vibrating tuning-fork was held on the patient's mastoid with the meatus closed until perception of sound ceased. It was then transferred to a normal ear and the time noted until the perception of sound by air conduction ceased. By means of the table referred to above this was translated into percentage retention of normal hearing distance (N.H.D.). If not already known, a similar observation was made with regard to the absolute bone conduction of a person with normal hearing; then the formula—

$$\frac{\text{Percentage retention of N.H.D. for patient's A.B.C.}}{\text{Percentage retention of N.H.D. for normal A.B.C.}} \times 100$$

gave the percentage of perceptive hearing present. Knowing, then, the percentage of total hearing present in a given case and also the percentage of perceptive (cochlea) hearing it was easy to determine to what extent, if any, the deafness was due to changes in the conduction (external and middle ear) apparatus.

It might be objected, said the President in conclusion, that such methods as these were laborious and crude, and moreover uncertain because the personal equation of two individuals was involved. He knew of no other method, however, that would tell him what he wanted to know. He was also sure that neither investigations regarding otosclerosis nor any other similar researches would really prosper until methods of testing ears and estimating hearing capacity had been standardised. The last attempt made by the Section of Otology had been by a committee set up in 1917 at a period when few were able to give much time or attention to the subject. Was it not time that the Section made another attempt to solve this important problem ?

Dr. KERR LOVE (Glasgow) read a paper entitled

A Classification of Deafness Based on the Effect of Deafness on Efficiency.

He said he approached the subject from the standpoint of the capacity of the deaf person. He invited a comparison between the child of 5 years with normal hearing and one of the same age who was born deaf. The former was full of life and chatter, with a small but increasing vocabulary, whereas one felt helpless in attempts to amuse the deaf child. It took ten years of special education to equip the deaf child for any walk in life, and at the end of that time his choice of an occupation was restricted. Dr. Love submitted four subdivisions: (*a*) Cases in which the deafness was congenital, including a small proportion in which the cause was congenital syphilis. Mostly these cases had some island of hearing in their deafness. (*b*) Mute, or semi-mute. In the matter of capacity these did not differ materially from the first class. They might have to go into special schools for the deaf. Usually the deafness was total, and may have been due to cerebro-spinal fever or to syphilis. (*c*) Those who had become deaf after the speech habit had been well established. Generally here, too, the deafness was total, but owing to speech having been acquired in childhood the outlook in regard to usefulness and enjoyment was superior to that of the child born deaf. The basis of the teaching was the substitution of one sense for another. (*d*) The partially deaf, the largest and the most hopeful class, and one which came within the scope of hearing tests. If a person could hear the whispered voice at the distance of 20 ft. he was not likely to rest under any employment disability or handicap; but if a child could not hear whispered speech at 6 ft. he could not profitably remain in the ordinary class of an elementary school.

Dr. Love advocated four practical measures. The first was an intensive campaign against aural disease in children. The second was an intensive study of otosclerosis with the view to prevention. Thirdly, he favoured compulsory notification of cases of congenital syphilis; and lastly he would have the public educated about the causation of congenital deafness. Congenitally deaf people should not be allowed to marry into families having a like disability.

Dr. T. A. CLARKE (Canterbury) read a paper on

Hearing Tests.

He passed over the subject of the testing of the upper and lower limits, especially as the present methods of testing for these were fairly satisfactory. In performing Gellé's test one noted, he said, any change in the perception of bone-transmitted sound occurring during the alteration of air pressure in the meatus. Gellé supposed that increased pressure in the meatus caused inward movement of the drumhead, ossicles, and the footplate of the stapes, so causing a rise in the intralabyrinthine pressure, with consequent lessened sensitivity of the cochlea; that fixation of the stapes would prevent such a sequence and there would be no variation of perception. This view, Dr. Clarke considered, was untenable, though the actual significance of the Gellé test was not yet known. With regard to tests dependent upon perception of tuning-forks by air and bone conduction, these were the Rinne, the Schwabach, the Weber, and the Bing tests. Only the last of these needed explanation. In carrying it out the base of the tuning-fork was placed on the mastoid. When perception ceased the mastoid was occluded. If the fork then became audible Bing was said to be positive. These tests were important in making a functional diagnosis, and he considered it was their shortcomings which were responsible for the present unsatisfactory state of aural diagnosis. The fundamental reason for their

failure was that the result was influenced by changes in both conductive and perceptive functions, and therefore the result could be indicative of neither.

Physiologically, hearing power was the sum of the conductive and perceptive functions. The primary determination of the conductive function was difficult, either by subjective or objective methods, though Bing's test might provide an approximate indication. But the perceptive component could be accurately assessed by a comparison of the patient's absolute bone conduction. The test consisted, as the President had said, of the perception of a tuning-fork placed on the mastoid, the meatus being closed by the finger, and compared with the normal person's absolute bone conduction. In doing the test the tuning-fork should be raised and lowered, rather than kept in constant application, as fatigue might render the result unreliable. As soon as the patient ceased to hear the fork it was transferred to the tester's own mastoid and the meatus was closed. If the patient had no perceptive disorder there was no after-perception by the normal ear.

Dealing next with quantitative tests, Dr. Clarke said that one might express the hearing defect in arbitrary units, what the Americans termed "sensation units," or in intensity units, or on a hearing-distance basis. The last of these, in the speaker's view, was the best. It had been the custom to consider hearing, deafness, and the loudness of sounds in terms of distance. In practice the voice was an impossible agent in this connexion. Both the watch and the acoumeter were useful for testing hearing capacity in the matter of noises of high pitch. Electrical audiometers were valuable for research, but were not clinically practicable because of their complication, lack of portability, and cost.

Dr. Clarke concluded by describing his own procedure in testing, after which the three papers were discussed together.

In the discussion which followed, Mr. O. POPPER said that nobody had yet suggested a unit which everybody accepted; probably the President used one which was arbitrary. He agreed that absolute bone conduction was the only reliable test obtainable with the tuning-fork. He asked what means were adopted for ensuring that the tuning-fork was maintained at a constant distance from the ear. Also, could one always assume that the examiner's ear was normal? His criticism was that two systems were introduced—those of distance and time.

Sir JAMES DUNDAS-GRANT said that in carrying out tuning-fork tests there were many details, not brought out in the present discussion, which the thoughtful practitioner would have in mind. One was the factor of weight in the fork. A heavy fork was not calculated to give very satisfactory results for bone conduction. He agreed that the middle C (256 double vibrations per second) was the best fork to test with, but even forks of that note varied.

Mr. F. J. CLEMINSON regarded the Rinne test as entirely unnecessary.

Mr. ALEX TWEEDIE considered that Dr. Love's classification was a remarkably good one for educational purposes. But with regard to the 20 ft. whispering distance the speaker thought this should rather be taken as an arbitrary line between children requiring special treatment and children needing education in ordinary schools.

Mr. G. J. JENKINS said that for a long time the Bing test had been his great stand-by in arriving at an estimate of a patient's bone conduction. If one sounded a tuning-fork and then interfered with the low tones the high tones would be heard less distinctly. The great difficulty in measuring the hearing capacity with tuning-forks was to place the fork in the same position and at the right angle in each case. The least twist of the fork caused an appreciable difference.

Mr. A. J. STORY (National Institute for the Deaf) complained that at present one found children with all kinds of history and all degrees of deafness planted in the same school, often in the same class. The Institute wished to get a terminology of deafness which was based on the history and the degree of deafness, and which was intelligible to the ordinary teacher as well as to the medical practitioner. Dr. Love's classification would be very helpful in recommending to parents how best the child could be properly taught.

Mr. A. R. SHARPE (Leeds), speaking of his connexion with a deaf-and-dumb school, said Dr. Love's classification was a very sensible and sound one. One type met with was he who was truly mute, but was not a deaf-mute; he would apply to these the term "pseudo-deaf-mute," a child who heard but neither understood nor spoke, probably because of some fault in the cerebral system, such as auditory aphasia.

The openers replied briefly, and the Section then proceeded to the discussion of clinical cases.

SECTION FOR THE STUDY OF DISEASE IN CHILDREN.

AT a meeting of this Section on Nov. 5th Dr. F. J. POYNTON, the President, took the chair, and a paper was read by Dr. L. S. T. BURRELL on

FIBROSIS OF LUNG.

As many chronic pulmonary diseases began during childhood it was important, he said, to recognise and treat the various catarrhal conditions found at that period. Tubercle of lung was uncommon in infants, except as part of a general tuberculosis. During the first few years of life the mortality from tubercle was high, but afterwards it fell rapidly, until at the period between the seventh and sixteenth years it was very small. After 16, however, the mortality from the disease rose, reaching its maximum round about the fiftieth year; the mortality varied in different countries. There were three age-groups which could be usefully recognised in regard to tuberculosis: (1) the first five years of life, when general and surgical tuberculosis was common, pulmonary tuberculosis rare; (2) from 7 to 16 years, in which all forms of tuberculosis were rare; and from 16 to middle age, when the disease became more common, but was of a different type from that displayed by the child, in the savage, or in the inoculated guinea-pig. Tuberculosis of glands at the root of the lung was often present in children, but his experience had been that it was exceptional for the tissues of the lung to become subsequently infected. Therefore when one encountered a child with signs of tuberculosis in the glands of the chest there was no real reason for supposing that he would have pulmonary tuberculosis. Dr. R. C. Wingfield, at Frimley Sanatorium, had examined 160 hardened specimens of the contents of the thorax of children who had died from various causes in St. Thomas's Hospital, and had found macroscopic evidence of tuberculosis in the glands at the root of the lung in 17½ per cent., an observation which microscopical examination had confirmed. In these cases of tuberculous bronchial glands the disease normally became arrested, leaving as a sequel calcareous glands but no pulmonary affection. In some of the cases the children were listless, poisoned by the tuberculous toxin, but often there was little evidence of impairment of general health. When a child's lung was infected, there was a tendency to activity and rapid spread. The early case in the child did not necessarily show tubercle bacilli in the sputum, and they were absent, too, in late stages when fibrosis had occurred. Still, if the child caught a definite cold or had an attack of bronchitis the bacilli could be found in the sputum. Before the fibrotic change the child had probably been running about and playing like other children.

In the adult when there were signs at the apex of the lung it was assumed that their origin was tuberculous, and generally this was a correct assumption. But it could not be applied to children. On following up children who showed signs at the apex, or pneumonia, it was found that in a considerable proportion the behaviour was not that of tubercle. Hence in the case of a child with an acute apical lesion it was safe to give a better prognosis than could be given

for an adult in a similar situation. The kind of patient he was referring to was one who was suddenly taken ill with what was called pneumonia; the signs were at the apex of one lung only, but the condition did not settle down like a pneumonia, and after three or four weeks there was still a temperature, up in the evening, down in the morning. Eventually the temperature came down by lysis, and the signs disappeared. Was it tubercle? The tuberculin tests employed had, in his experience, the great disadvantage of being positive in many cases in which clinically there was no tuberculosis. A negative test was more valuable. If such a child had a tuberculous lesion, what had happened? Probably he had a small tuberculous infection, and then added to that was a fresh infection, giving a focal reaction. The same kind of thing could be seen in the adult. It was easier to understand the course if the second infection was caused by some organism other than the tubercle bacillus. His own feeling was that the majority of these cases of children who had an apical or other lesion which subsequently cleared up were non-tuberculous. Still, tuberculosis played an enormous part in the causation of fibrosis of the lung.

It was the catarrhal conditions which were so important, not only from the standpoint of the individual child, but also from that of his associates, especially in the same family. These led also to bronchiectasis. The main causes of catarrh in children were measles, influenza, whooping-cough, the chief of these being measles. In 1925 there were over 94,000 deaths of children under 15 years of age in England and Wales, and more than 20,000 of them were due to non-tuberculous respiratory diseases. For pulmonary tuberculosis the figure was 1500, and for other forms of tuberculosis 5000. It was very important that the non-tuberculous respiratory diseases should be recognised. And it might be expected that these non-tuberculous diseases would leave behind them fibrotic and other changes.

In lobar pneumonia there was an exudation which was as a rule completely absorbed when the patient recovered. It was the broncho-pneumonia following influenza and measles which caused destruction of bronchial membrane and lung tissue; there was healing by scar tissue, and the healing was not complete, cases of "unresolved pneumonia" being of this nature. Thus it must be remembered that it was the broncho-pneumonic type of disease which was accountable for the cases of fibrosis. In children who had repeated attacks of bronchitis it was often found that the same part of the lung was attacked in each illness; and this could not be dismissed as a coincidence. Usually—and this was important from the standpoint of prevention—these children who had frequent colds and bronchial attacks had brothers and sisters who were known to be "chesty." Therefore if the first case in a family were treated thoroughly, there would be a good chance of lessening the total incidence of the states under discussion. The damage present after the onset of bronchiectasis could not be repaired. Much could be done before the onset of fibrosis: all sources of infection, such as tonsils, teeth, the gastro-intestinal tract, should be treated; Dr. Burrell advocated the use of a vaccine (autogenous if possible), as in his view it was more useful in childhood than in adult life. The giving of a vaccine seemed, both in hospital and in schools, to lessen the incidence of catarrhal and bronchial colds. He started very gradually, using 0·1 c.cm., and working up to a dose which caused a reaction, but never going beyond 1·0 c.cm. Dr. Burrell had a great belief in a long holiday for these children, the place and circumstances varying somewhat with the particular child's temperament. They should be kept out of hot stuffy rooms, and should be under rather than over-clothed. Many such children had intestinal toxæmia too.

Another group, surgical rather than medical, was that in which fibrosis followed empyema. It was now treated in a special way surgically, and it did not therefore lead to the serious fibrosis formerly seen as a sequel.

Discussion.

Dr. A. G. MAITLAND-JONES thought it should be emphasised that tuberculosis was a somewhat rare cause of fibrosis of the lung in children. Some talked of a condition termed "epi-tuberculosis," and he would like to hear more about that. He referred to the kind of case in which a child came with what seemed to be pneumonia; the illness lasted one or two months, with a fever, and then the temperature fell to normal, and physical signs of dullness remained in one or other lobe, perhaps with some crepitations. The condition might be thought to be fibrosis, but after persisting for two, three, perhaps five months, the signs cleared up completely. Was it justifiable to say that fibrosis was present?

Dr. HILDA STOESINGER spoke of the lessons learned in following up consecutive cases of broncho-pneumonia and allied conditions admitted to the Royal Free Hospital. Repeatedly she had noticed that cases with symptoms of localised pulmonary catarrh were occurring every two or three weeks. In a large proportion of cases of both lobar pneumonia and broncho-pneumonia there was a family history of contact with others having respiratory disease. Of 32 consecutive cases of lobar pneumonia 22 had a past history of recurrent bronchitis or pneumonia, and 16 had a family history. Of 34 consecutive cases of broncho-pneumonia 19 had a past history (no statement in 3) and 17 had a family history. These figures pointed to the importance of carefully supervising all cases of pneumonia whose clinical course resembled that of lobar pneumonia. She raised the question of the value of X rays in the diagnosis of these conditions.

Dr. C. D. S. AGASSIZ, speaking of experience in an institution with 350 beds for tuberculous children, said he thought that pulmonary tuberculosis in children was not uncommon; he found that a third of the cases of the pulmonary form showed the bacilli in the sputum. Was it Dr. Burrell's experience that in fibrosis of the lung the signs were most marked at the base of the lung? He himself had found that they were. Sometimes both bases were involved; the signs cleared up quickly, but came back again.

Dr. H. E. A. BOLDERO spoke of the good work done for these children in infant welfare centres, and said he would like to hear more about preventive measures. It was easy to suggest an out-of-door life and isolation from cases of coryza, but it might be well to persuade mothers wholesale to agree to inoculation with serum.

Dr. J. WATT raised the question of what happened to children who had non-tuberculous fibrosis of the lung, as the condition was seldom seen in the adult. Did such children succumb in adolescent or early adult life? Did they or did they not develop bronchiectasis? Or was tubercle grafted on to their fibrosis?

Dr. A. G. PHEAR spoke of children who had very definite signs in childhood, but later lost those signs. He thought a case of slowly resolving pneumonia, seen for the first time, might easily be regarded as a permanent fibrosis or bronchiectasis.

Dr. G. A. SUTHERLAND held that it was quite exceptional for fibroid lung to end in bronchiectasis. Lobar pneumonia probably never led to fibroid lung; a large number of cases of the latter condition, in his experience, recovered. Fibroid lung seemed to be a local disease—i.e., one arising in the lung itself—and the pathologist could usually find several organisms, such as streptococcus, the *Micrococcus catarrhalis*, and the influenza bacillus. With children living the life they did in London it was not surprising that among the organisms found was the tubercle bacillus. His own view of the ultimate fate of children with fibrotic lung was a favourable one.

Dr. F. PARKES WEBER questioned whether typical recurrent attacks of clinically slight pneumonia had ever led to fibrosis of the lung; he was sceptical on the point.

The PRESIDENT said he supposed that, apart from rheumatism and tuberculosis, fibrosis of the lungs

was one of the most important of children's diseases. The way some of the cases recovered—even those with extensive fibrosis and displacement of the heart—was surprising. Perhaps the signs heard suggested that the lesion was more extensive than it actually was. He had seen the experimental work done by Mr. Morriston Davies and others in earlier days, and had been astonished to see how, after the phrenic nerve had been torn away and ribs resected, recovery took place up to a certain stage. He agreed about the fine preventive work being done by infant welfare centres, and about the frequency with which infection in one part of the lung lit up time after time with fresh catarrhal visitations. He had particularly wished to have the surgical aspect of empyæma discussed, as for a number of years he had been working at the avoidance of open operation for these cases, substituting for it some form of closed surgery. Seeing how damp and miserable were some of the homes of these children, the number of recurrent attacks of respiratory disease was not surprising. He was not a great believer in vaccines.

Dr. J. S. JOULE raised the question of diagnosis as between collapsed lung and fibrosis of lung, and asked whether investigations with lipiodol had been made.

Dr. BURRELL briefly replied.

HUNTERIAN SOCIETY.

AT a meeting of this Society held at the Cutlers' Hall on Nov. 5th, under the presidency of Dr. A. WESTERMAN, a discussion on

THE DOCTOR ON THE STAGE

was opened by Mr. WILLIAM DEVEREUX, who said that doctors he had played on the stage always looked preternaturally wise and never knew what was the matter with the patient. Was that lifelike? In both professions all that was necessary was a good bedside manner, and a great deal depended on the audience. The actor took off his hat to the doctor because he was always willing to use his skill for nothing, night or day, in the service of humanity. He belonged to a profession that—whatever its rewards—would always be underpaid.

Lady SIMSON (Miss Lena Ashwell) spoke of "The Doctor's Dilemma" as a fit companion to Shaw's latest book, "The Intelligent Woman's Guide to Socialism"; their value as a serious contribution did not amount to the row of pins mentioned in the book. There were many points of similarity between the drama and medicine. The University of London had now recognised the importance of drama in the life of the people by instituting a diploma of dramatic art. From recent papers in the examination for this diploma she selected the following as of interest to medical men:—

1. For the physician: "Discuss the significance of Aristotle's theory of catharsis." 2. For the alienist: "Discuss heredity as treated respectively in any Greek or modern play." 3. For the orthopædic surgeon: "Give an account of the principal changes in boots and shoes from William the First to Elizabeth." 4. For the New Health Society: "Describe the method of preparing and the dishes served at a banquet given by (*a*) Richard II., (*b*) Cardinal Wolsey, (*c*) Charles II." 5. For the anatomist—and she would ask any member of the audience who could answer it to raise his hand: "Explain the various mechanisms of the body whereby balance is maintained."

Team-work was vital to both arts; the production of a play required the coöperation of a large number of specialists in different lines, and on the stage there was also the all-round man who played in repertory and could be compared with the family physician. The medical profession was far better organised than the dramatic. The part that could be played by the dramatist in the well-being of the nation was in every respect comparable with that played by the doctor—the mind was, of the two, more important than the body. The body was well guarded by the Government; there was a General Medical Council, a Ministry of Health, medical officers of health, and poor-law hospitals, but at present nothing was done to protect the public's artistic life. She looked to the day when there would be a Ministry of Fine Arts and a national theatre, and when every town should have its dramatic building, belonging to the people and ensuring that the mind of the people should be safely guarded. It was impossible to over-emphasise the necessity for looking after this side of human life. Miss Ashwell spoke of her work in the war, and said that one experience was deeply engraved in the feelings of all her 600 helpers, that the great mass of the army liked the very best things; it was impossible to give them anything too good if it could be given well. The idea that the masses really preferred bad things was not true. They had found that the work of music and poetry and plays was definitely healing. Drama was the only way of bringing to people some vision of other people's lives. Immensely important questions that could not be broached on a political platform could be discussed through the medium of a play like "The Skin Game," where both sides were put in the form of struggling human feeling. Often that was the only opportunity the audience ever had of seeing both sides. Miss Ashwell related the story of a mutiny checked by the playing of "Candida," and of a fierce clerical opponent of the drama who found his healing from intractable war-obsessions, which church and hospital alike had failed to cure, in Barrie's "Dear Brutus." She begged doctors to think of this side of mankind that could only be fed by the arts, and to work for the day when the majority could have, at a price they could afford, the very best music, the very best plays, and the very finest kinema, instead of the constant reiteration of murder, of thieving, and of debased sex problems which were not the best thing for our older civilisation.

The Doctor in Shakespeare.

Sir STCLAIR THOMSON deplored the misunderstanding between sexes, classes, ages, and professions, and quoted Huxley's definition of heaven as "a place where I shall no longer be misundertood." All classes, ages, and professions were very often misrepresented on the stage. Shakespeare had rather made fun of doctors up to King Lear, which was written in 1606, but in that play the doctor was a highly honourable and sympathetic character. In 1607 Shakespeare's daughter had married Dr. Hall, and it might be that the son-in-law had opened his father's eyes to the difference between properly qualified men and mountebanks, both inside and outside the profession. No surgeon appeared in a Shakespearian play, although Lear said "Let me have a surgeon; I am cut to the brains," and Portia warned Shylock: "Have by some surgeon, Shylock, on your charge, to stop his wounds lest he do bleed to death." Physicians appeared seven times in the 36 plays. In "Macbeth" there were two—an Englishman and a Scotsman. The former made a speech about the cure of scrofula by the royal touch:—

> There are a crew of wretched souls
> That stay his cure; their malady convinces
> The great assay of art; but at his touch—
> Such sanctity hath heaven given his hand—
> They presently amend."

The Scots doctor was very canny. "I will set down what comes from her," he said, "to satisfy my remembrance the more strongly." And, "I think, but dare not speak," he said. It had been suggested that he was a timid man, trying to hand on a difficult patient to another practitioner: "more needs she the divine than the physician," regarding her as a criminal and declaring himself unable to minister to a mind diseased. There was no disparagement to the art and science of medicine in Shakespeare's distrust of physic, for to

> "pluck from the memory a rooted sorrow, raze out the written troubles of the brain and with some sweet oblivious antidote cleanse the stuff'd bosom of that perilous stuff which weighs upon the heart."

What could be better than auto-suggestion, wherein "the patient must minister to himself"—a method of

recent recognition, but advocated by Shakespeare all those years ago. Macbeth, being a man of action, little given to reflection, called for his armour and his staff and threw "physic to the dogs." Another Shakespearian physician was Dr. Butts, in "Henry VIII." The original of this character was Dr. William Butt, Fellow of Gonville and Caius College, Cambridge, and of the College of Physicians, a man of great repute at court. Cornelius, in "Cymbeline," played a difficult part with great honour and astuteness when the queen asked him for poison. He reproved her with dignity, and when she insisted—and he could not disobey a royal command—he gave her a comparatively harmless drug, not trusting her statement that she required it for animal experimentation only. Doctors might ever lay this flattering unction to their souls that nowhere in the whole of literature was found a nobler panegyric than the words of Cerimon in "Pericles":—

> "I hold it ever,
> Virtue and cunning were endowments greater
> Than nobleness and riches; careless heirs
> May the two latter darken and expend;
> But immortality attends the former,
> Making a man a god . . .
> And I can speak of the disturbances
> That nature works, and of her cures; which doth give me
> A more content in course of true delight
> Than to be thirsty after tottering honour,
> Or tie my treasure up in silken bags,
> To please the fool and death."

The Doctor on the Contemporary Stage.

Mr. IVOR BACK investigated first the dramatist's conception of life in Harley-street—for the dramatist, he said, the only street. Fruitless to protest to him that large fortunes had been accumulated in Brook-street or in Cavendish-square; he would not believe you. This street was long enough in real life—it had 145 houses—but on the stage it had nearly a thousand. In a recent play a surgeon had lived at No. 915. This immense and dreary avenue was peopled entirely by surgeon-baronets. In fact the surgeon-baronet was a comparatively rare bird, and many of them dragged out their miserable existence in the remoter recesses of provincial towns. To the dramatist the dweller in Harley-street was always a surgeon. Why? The reason was that the surgeon was the last of the great romantics. The soldier, the poet, the painter had had their day, but the surgeon was still to the public a queer romantic creature who spent most of his time doing operations of extraordinary gravity in which a slip of one-sixteenth of an inch to one side or the other meant the life of the patient. Admittedly it was difficult to introduce on the stage any complaint so hateful as the homely hæmorrhoid or so humdrum as the humble hammer-toe, but in real life the surgeon was called on to deal with these quite as often as with the graver abdominal lesions. Often the surgeon—although described as such in the programme—did not act like a surgeon at all, but indulged in the behaviouristic vagaries associated with the physician; he carried a stethoscope, he listened to chests, he talked, and he administered poisons. The stage surgeon nearly always had a large family of grown-up sons and daughters and led a kind of communal existence with them in one living room. If this room had a knee-hole desk with a stethoscope on it it was a consulting-room; if it had a grand piano it was a drawing-room. Whichever it was, it was peopled indiscriminately throughout the play by the surgeon, his family, his servants, and his patients. In one play Mr. Back had seen a patient examined in the presence of 11 other people, including one butler and one kitchen maid. If an operation was to be performed the stage surgeon rang up a random number and ordered a nurse, without any question as to whether one were available or not. No one who had tried to get a surgical nurse at midnight for an emergency would need to be reminded of the real facts. On the stage the nurse arrived in a second or two, without cap, cloak, or luggage. In one play she had bounced on, turned on a gramophone, and danced a Charleston with the surgeon before making a single inquiry about the case. In another the operation had been performed in a small room leading off the drawing-room, the audience being allowed to see a few towels and tin pans through the communicating door before the curtain mercifully fell. The great authors, other than dramatists, gave his due to the general practitioner, the devoted slave of the great British public and their guide, philosopher, and friend. He would add to the panegyric quoted by Sir StClair Thomson the words of Robert Louis Stevenson:—

> "There are men and classes of men that stand above the common herd, the soldier, the sailor, and the shepherd not infrequently, the artist rarely, the clergyman more rarely still—the doctor almost as a rule. He is the flower, such as it is, of our civilisation, and when that stage of man is done with he will be thought to have shared as little as any in its defects. Generosity he has, such as is possible to those who practise an art, never to those who drive a trade; discretion tested by a hundred secrets; tact tried in a thousand embarrassments and, what are more important, herculean cheerfulness and courage, so that he brings air and cheer into the sick-room and often enough, though not so often as he wishes, he brings healing."

By the dramatist he was represented either as what the French called a "faux bonhomme"—a man full of beans, benevolence, and bunkum—or as a frank buffoon, or thirdly, as a venal scoundrel in the pay of the villain with a bottle of chloroform in his pocket. This he administered to his victims on a handkerchief, producing in two seconds a profound anæsthesia and complete muscular relaxation. The speaker wished that he would teach his technique to some of the surgeon's anæsthetist colleagues. There were innumerable examples of irresponsibility in nomenclature and technique, such as the "jugular artery" and operations on the head which in five minutes altered the patient's entire character. These errors might be avoided by invoking the assistance of a medical man. Sir Henry Irving, who had been very particular about accuracy, had once called on the two leading doctors of his time to assist him in a production. At the dress rehearsal these gentlemen were in the stalls, and a stage carpenter had been heard to murmur: "Sir 'Enery Irving, Sir H'Andrew Clark, Sir Frederick Treves—three blinking knights—and that's what the blinking play will run." Medical coöperation could not therefore be relied on to ensure success.

Mr. P. COLE remarked that the actor gave the public medicine just as the doctor did, but in a much more palatable form. The building in which the present meeting was being held had most interesting historical connexions with both professions.

Dr. CAMPBELL MCCLURE said he had never seen a stage doctor use the old-fashioned straight stethoscope with his ear at the right end. Another thing that had struck him was the ease of prescribing; the stage doctor dashed off a most complicated prescription in a few seconds, adding the words "two tablespoonsful in a draught of water three times a day after meals" with a single stroke of his pen. He pleaded for a little leniency and a little study on the part of great dramatists who presented medical men on the stage.

The President then called upon Dr. J. W. EYRE to propose, and Dr. T. B. HYSLOP to second, a vote of thanks to the speakers. The latter mentioned the difference between insanity as portrayed on the stage and as seen within the walls of Bethlem.

GREAT ORMOND-STREET HOSPITAL FOR SICK CHILDREN.—Mr. H. P. Macmillan, the chairman, and Lord Warrington of Clyffe, the vice-chairman of this hospital, have written to the press lamenting "the imminent failure" of the project for transferring it to the site of the Foundling Hospital. "The reason," they say, "is solely the want of money," the sum required being £600,000.

BECONTREE HOSPITAL.—It is proposed to erect a general hospital of 300 or 400 beds at Becontree, the new "dormitory" town by Ilford. King Edward's Fund have promised to contribute £10,000 towards the cost if voluntary contributions amounting to at least as much are forthcoming, and the Housing Committee of the London County Council (the owner of most of the houses) is recommending the Council to contribute a further £10,000.

Reviews and Notices of Books.

TOXINS AND TOXOIDS.

Handbuch der Biologischen Arbeitsmethoden: Abt. XIII., Teil 2, Heft 7. Edited by E. ABDERHALDEN.

Toxine und Toxoide. By E. LÖWENSTEIN, Vienna. Berlin and Vienna: Urban and Schwarzenberg. 1928. Pp. 109.

THE determination of the chemical constitution of toxin and of the chemistry of specificity are the main problems that allure and still baffle the immunologist. Obermayer and Pick, Landsteiner, Avery, and others have applied biochemical methods to the purification and separation of toxins, and this has led to the identification of the interesting haptenes, which react with antigens in vitro, but are not themselves antigenic when given alone; these workers and others have prepared the chemically altered specific antigens, diazo and nitrated protein antigens. Further interesting light on specificity comes from the racemisation work—though the author apparently does not mention it—of H. Dakin and H. W. Dudley. A difficulty in investigating the properties of toxins is that, like ferments, they seem to become more unstable the more they are "purified." Dr. Löwenstein confesses that we are not much nearer the solution of the problems connected with them than we were 30 years ago. The author deals mainly with typical toxins such as those of diphtheria and tetanus and their modification by physical and chemical means into toxoids, and with tuberculin. He deals at some length with the persistent quest of the immunologist to obtain a body which may be completely free of toxicity and yet will on injection give rise to protective antibodies. Ehrlich's unsuccessful attempts with iodine and Löwenstein and Eisler's work in Austria with iodine, and with formalin coupled with light or heat, from 1903 onward, are described at some length. These relate mainly to tetanus toxin. Ramon, in 1923, reinvestigated the process and, by formalinisation with heat, came nearer to success than any of the previous German workers in making a diphtheria toxoid and later a tetanus toxoid free of all toxicity but antigenic in character. Questions of priority are generally unattractive, but it is perhaps well that the history of formalinisation of toxin should have been put on record by Dr. Löwenstein. This record, together with the mention of the use of formalinised diphtheria toxin long prior to 1923 by A. T. Glenny and H. J. Sudmersen in this country, sets out the history of the investigation of the interesting and puzzling action of aldehydes—pre-eminently formaldehyde—on toxins. The chemistry of this action is still not clear.

Ramon's great contribution to immunology—the flocculation method—is well described. Dr. Löwenstein, after expressing his feeling that the French school did not carry out sufficient parallel researches on the determination of the binding value (or L+), does not share Ramon's conviction that the flocculation value of toxin or antitoxin is practically the only important measure of immunological value. He does not discuss the latest work, notably of Glenny in London and P. J. Moloney and colleagues in Toronto, which seems to suggest that though the flocculating value, Lf, is at present the best ascertainable value of a toxin, it is not a complete expression of its immunising value, nor is the flocculation value always the true value of an antitoxin as measured in the classical Ehrlich method. The challenge to this latter method of measurement by R. Kraus and by Th. Madsen, who suggest that the "avidity" of an antitoxin is of more importance than the Ehrlich unitage, is mentioned. In the course of a discussion of various methods of active immunisation with toxin-antitoxin mixtures and toxoid, the author mentions that immunisation against diphtheria has been compulsory in schools in U.S.A. So far as we know this is erroneous; any introduction of compulsion in connexion with this particular method of prophylaxis might well set back the clock.

Considerable attention is given to dissociation of toxin-antitoxin mixtures, and the author concludes this section with a rapid review of formalinised dysentery and gas-gangrene toxins, snake poison, abrin, and so forth. The final section describes the making and testing of tuberculin with a short description of the two components, the carbohydrate body of H. Zinsser and P. P. Laidlaw, reacting in vitro, and the purified tuberculin of F. Seibert and E. R. Long with its specific toxicity.

Though the bibliography is not as full as the specialist in this field would wish, this monograph is one which every immunologist will desire to have in his library.

THE PURDAH SYSTEM AND ITS EFFECT ON MOTHERHOOD.

Osteomalacia Caused by Absence of Light in India. By KATHLEEN OLGA VAUGHAN, M.B. Lond., sometime Superintendent of H.H. the Maharajah of Yammu and Kashmir's Diamond Jubilee Zenana Hospital, Srinagar, Kashmir. Cambridge, England: W. Heffer and Sons, Ltd. 1928. Pp. 48. 2*s.* 6*d.*

Miss Vaughan's little book is not a scientific treatise, but is an effort to show what an immense amount of unnecessary suffering the purdah system lays upon women in India. When purdah is strictly observed there is an almost complete lack of exposure of the skin to direct sunshine. Osteomalacia is very frequent, particularly among women of the child-bearing age, and Dr. Vaughan correlates its incidence with the lack of direct sunshine. The various claims of deficiency in light or in diet as the causal agent are discussed, and the author concludes that lack of light is the prime cause. If the osteomalacia described is really due to an avitaminosis with vitamin D, as it seems clear that it is, then it should certainly be curable by increased light; but it should also be curable by a better diet. One might put it that the light is insufficient when so poor a diet is consumed, or conversely that the diet is too poor when exposure to light is so deficient. It is unfortunate that so many writers still make an antithesis where none in reality exists. No doubt Dr. Vaughan is really tilting against the purdah system and would sooner see it abolished than insist on an alteration made in the dietetic habits of those who use it. From the point of view of prevention of osteomalacia the essential factor is the provision of vitamin D, and if this is easier to procure by advising alteration of dietetic habits than by urging the abolition of the purdah system, the more practical means of reform should be adopted.

THE CONQUEST OF LIFE.

By SERGE VORONOFF, M.D. Translated by G. GIBIER RAMBAUD, M.D. London: Brentano's Ltd. 1928. Pp. 201. 15*s.*

Dr. Serge Voronoff has written many works for the profession. He now turns his attention to the laity. His latest work is a popular exposition of the author's method of rejuvenation by means of grafts. It is, of course, natural that the public should desire to be kept informed of important advances in science, and there could be no advance of greater importance than one which claims to have the effect of postponing the ills of old age. It is doubtful, however, whether a book from the pen of an enthusiast concerning results which are still doubted by the majority of scientific men is to be welcomed. Interesting and important as are Dr. Voronoff's findings, they have not been accepted in their entirety by the medical world. The deputation of biologists and veterinary experts who recently visited the experimental farms in Algeria returned interested but unconvinced that Dr. Voronoff had proved his tenets. Many of his experiments lacked proper controls and no precautions

had been taken to guard against unconscious selection. Moreover, although numerous cases have been recorded of improvement in health and increase of vigour following the implantation of testicular grafts in human beings, the results of these operations are by no means constant. His work, therefore, is yet in the experimental stage, and a popular exposition written in the vein of "The Conquest of Life" is somewhat premature. It will arouse various hopes in the minds of those who dread the arrival of old age. Life has not yet been conquered, and the hope that has ever been present in most hearts of finding the fountain of youth is still only a hope. Nevertheless Dr. Voronoff's book is stimulating. Some of his results cannot be put aside. The case of Jackie the Bull, who has twice been grafted and has now reached the age of 20 in apparent good condition, is sufficiently remarkable to make a sceptic pause and think. "The Conquest of Life" will not appeal to sceptics; but if, as the publishers' note puts it, it is meant to be "a narrative of surprising interest, as gripping as a best seller and as full of surprises as a mystery story," then the author has achieved his object.

THE GLORY OF DISCONTENT.

Studies in Modern Social Problems. By F. TUDSBERY. London: H. F. and G. Witherby. 1928. Pp. 232. 7*s.* 6*d.*

THE author of this little book is neither bolshevist nor cynic, but an amiable man who thinks that our relations with God and with one another might be much better than they are. He has written a series of pleasant simple essays to suggest that conventionality can be carried too far. These essays are not argumentative; the author tries always to see the third side of every question with a gentle reasonableness which many people will find helpful. It is a pity that he misquotes Wordsworth. The book would be welcome to many a convalescent.

JOURNALS.

JOURNAL OF PATHOLOGY AND BACTERIOLOGY. Vol. XXXI., Part 4. Pp. 597–930. October, 1928.—The Gram-negative Cocci of the Nasopharynx with a Description of *Neisseria pharyngis*, by G. S. Wilson and M. M. Smith (London). The classification and differentiation of these cocci are extremely muddled and unsatisfactory; several supposed species are united under a new name.—Tumours of the Skin and Mammary Glands caused by Pyrogenous Products of Cholesterol, by E. L. Kennaway and B. Sampson (London). "Tar" produced by heating cholesterol to about 800° C. is carcinogenic in mice (skin) and rabbits (mammary gland).—The Pathogenic Values of Pneumococcal Types: the Lesions Produced in Relation to Virulence, by J. F. Gaskell (Cambridge). The pathogenicity of Type II. and Type III. strains is lower than that of Type I. and the lesions produced are milder; Group IV. contains some strains which are highly virulent and pathogenic.—The in vitro Titration of *B. welchii* Antitoxin by its Antihæmolytic Power, by J. H. Mason and A. T. Glenny (Beckenham). The method gives as good results as the direct toxin test in mice.—Histamine and Infection, by G. M. Findlay (London). Injections of histamine determine local infection by various bacteria and viruses; this is the explanation of the clinical association of trauma with, e.g., osteomyelitis and tuberculosis.—Polycythæmia in the Rabbit Following Operations Involving the Peritoneum, by R. H. Mole (Moukden). A moderate degree of polycythæmia follows four different operative procedures, under ether or novocaine anæsthesia, involving the peritoneum.—A Case of Endocarditis in Man Associated with *Bacillus parainfluenzæ* of Rivers, by D. S. Russell and P. Fildes (London). A girl of 18 with a rheumatic history. The anatomy and bacteriology are fully described.—Giant-cell Tumours of Bone in a Fowl, by S. L. Baker (London). Two osteoclastomas: transplantation failed.—Neuroblastoma of the Suprarenal Glands, by N. B. Capon (Liverpool). An example of the Pepper type of adrenal tumour with a review of the literature.—The Relation of Agglutination by Specific Serum to Agglutination by Acid, by J. A. Arkwright (London). In the typhoid group the flagellar and somatic agglutinable substances react with acid at different zones of hydrogen-ion concentration.—The Action of Immune Serum on Vaccinia and Virus III. in vitro, by C. H. Andrewes (London). Immune serum which is highly potent in preventing infection does not destroy vaccinia virus in vitro; there is no evidence of a stable antigen-antibody union, and a neutral mixture may be reactivated by simple dilution.—Capillary Permeability in Acute Uranium Nephritis, by the late Caroline Whitney (St. Louis). Uranium poisoning diminishes the permeability of the capillaries so quickly that it may be presumed to act directly and not through its nephritic effect.—Experiments on the Production of Hyperplasia in the Alveolar Epithelium of the Lung of the Rabbit, by J. S. Young (Leeds). Active proliferation of the epithelium of the marginal alveoli is caused by the intrapleural injection of sodium, calcium, strontium, and aluminium salts in proportion to their valencies.—The Appearance of Doubly Refracting Substances in Formalin-fixed Rabbit Tissues, by J. B. Duguid and J. Mills (Cardiff). Tissues which are apparently thoroughly fixed in formalin develop myelin substances on keeping in a slightly acid medium.—The Oxygen Tension Necessary for the Mitosis of Certain Embryonic and Neoplastic Cells, by G P. Wright (London). In tissue cultures the lowest concentrations of oxygen at which cell division continues are for chicken heart myoblasts about 1·6 per cent., for Jensen rat sarcoma 0·8 per cent., and for a mouse carcinoma 0·4 per cent.—The Relationship Between the Bactericidal Power of Normal Guinea-pig Serum and Complement Activity, by J. Gordon and Arthur Wormall (Leeds). Hæmolytic complement and bactericidal complement are probably identical; normal guinea-pig serum contains a bactericidal immune body.—Fixation of Complement by *B. typhosus* and Normal Guinea-pig Serum, by E. M. Dunlop (Glasgow). An interesting and useful study of natural antibody.—Chordoma of the Vertebral Column with Three New Cases, by D. F. Cappell (Glasgow). Two cervical and one dorsal case. The condition is related to the embryonic history of the notochord.—The Blood Changes After Splenectomy in Splenic Anæmia, Purpura Hæmorrhagica, and Acholuric Jaundice, with special reference to Platelets and Coagulation, by W. Howel Evans (Liverpool). The platelets and blood coagulation time were studied before and after splenectomy in ruptured normal spleen (one case), splenic anæmia (five), purpura hæmorrhagica (four), and acholuric jaundice (two). Except in one case of purpura there was a considerable rise of platelets and a diminution in coagulation time after splenectomy.—The Relation of the Blood Platelets to Thrombosis after Operation and Parturition, by R. Y. Dawbarn, F. Earlam, and W. Howel Evans (Liverpool). After many surgical operations and after childbirth the platelets in the blood begin to increase about the fourth day, reach a maximum about the tenth day, and then decline to normal. This is causally related to post-operative thrombosis.—The Types of Tubercle Bacilli in Human Bone and Joint Tuberculosis, by A. S. Griffith (Cambridge). In 598 cases bovine bacilli were found in persons of all ages in 20 per cent., in children under 5 in 33 per cent., in children between 5 and 10 in 24 per cent.; no case over 23 years yielded bovine bacilli. There is inconclusive evidence that bovine bacilli account for a relatively larger proportion of spinal cases.—*B. proteus* Infections, by J. F. Taylor (London). The organism is more pathogenic than is often supposed and is the active agent in a number of urinary and suppurative lesions.—A Sacral Neuroepithelial Tumour of Fœtal Origin, by W. Susman (Manchester).—Obituary notices of W. H. Ferguson (portrait) and G. R. James.—Book received. Title page and indexes.

THE LANCET.

LONDON: SATURDAY, NOVEMBER 10, 1928.

USE AND ABUSE OF COUGH.

How the secretions of the bronchial tree are brought up to the surface from the depths of the chest is the well-chosen subject of the Schorstein lecture which appears at the front of our present issue. In this lecture Dr. CECIL WALL deals in a learned and comprehensive manner with the facts and theories of respiratory movement, and in particular with the cough which is the final chapter in the physiological process of expectoration. Expectoration, he says, is effected by raising the intrapulmonary air pressure and then suddenly allowing the air to escape and carry with it any peccant matter that may be lying in the air passages, and he makes it clear how this mechanism can be put to the best advantage under various conditions. He does not deal in this lecture with the ciliary movement, described long ago by GOSSELIN, which is the first act of expectoration and was the subject recently of some very interesting experiments reported in our columns by Dr. LEONARD HILL (Oct. 20th, p. 802). SHARPEY showed that the direction of ciliary movement in the air passages of mammals and birds is towards the larynx. Dr. HILL does not state so definitely, but it may be assumed that the fact of ciliary movement and its direction holds good also in human beings. In an inquiry into the factors which govern ciliary movement he shows very clearly that the movements of the cilia can transfer, in a comparatively short time, secretion and foreign particles to the rima glottidis. The cilia act best in a neutral medium, their movements cease in acid or alkaline solutions, but begin again when sufficient alkali or acid is added to produce neutrality. The rate of transit when the trachea is horizontal is twice as fast as when it is vertical. Further, ciliary action is accelerated when the membrane is evenly stretched. Extensive damage to the membrane has the effect of stopping the movements of the cilia. Drugs applied locally vary in their effect. Solutions of ammonium chloride, absolute alcohol, oil of eucalyptus, caffeine, urethane, watery infusions of opium or belladonna apparently have no effect on the ciliary movement. Mercuric chloride, mercury alanin, carbolic acid, and arsenical war-gas fumes either slow the movement or abolish it altogether. Chloroform is more poisonous to the cilia than ether, but in the form of vapour as used for anæsthesia neither has any effect on ciliary movement. Dr. HILL does not himself suggest any clinical applications, but his observations, added to those of earlier investigators, make it certain that the ciliated cells of the tracheal and bronchial mucous membranes, by their powerful rhythmical movements, do transport bronchial and pulmonary secretion, mixed with foreign matter such as dust particles, up to the rima glottidis whence it is either swallowed or expelled as sputum. Ciliary movement is clearly the primary agent in the process of expectoration, to which the muscular mechanism of respiration gives merely an approbatory fiat.

This factor of ciliary action is of more than academic interest. For if the conception of expectoration is restricted to the muscular mechanism of respiration, cough comes to be regarded as an explosive expiratory act depending on the presence of excessive secretion in the bronchial and alveolar trees. Whereas if the ciliary function is properly regarded, cough associated with sputum becomes for the most part an ill-controlled and unnecessary act, only really necessary when the cilia have been destroyed by inflammation or by trauma. Even in bronchiectasis, where large quantities of purulent sputum have to be expectorated, the act of coughing may be largely eliminated by making use of the force of gravity as in postural drainage. But the cough reflex is not necessarily associated with the presence of pulmonary secretion and subsequent expectoration. It is true that coughing may be initiated by irritation of the mucous membrane of the larger bronchi by such stimuli as irritating gases, cold air, and excessive secretion. In bronchiectasis coughing is only aroused when the contents of the cavities are brought into contact with the mucous membrane of the larger bronchi either by overflow or by a sudden change in position. With this exception the cough reflex originates, strange as it may seem, in the majority of cases in extra-pulmonary situations such as the larynx, the pharynx and naso-pharynx, the mediastinal glands, the stomach, or the ear. To realise this one has only to recall the classical types of cough such as the stomach cough, the ear cough, and the throat cough, all types of reflex vagal stimulation; the pleuritic cough; the gander or brassy cough which is heard when the recurrent laryngeal nerve is involved in aortic aneurysm or in new growth of the mediastinal glands. Again the cough in pertussis bears a striking resemblance to that heard in children suffering from mediastinal enlargement. Clinical and radiological evidence alike suggest that the exciting cause of the cough is the same in both cases—namely, glandular enlargement producing reflex vagal irritation. Experience with lipiodol fails to disclose any cough reflex in the smaller bronchi and it seems that this chiefly comes into play when the secretion reaches the larger bronchi, the trachea, the larynx, and especially the pharyngeal wall. If the cilia are intact and their movement unimpaired, the act of coughing may be unnecessary and even harmful.

The best illustration of this thesis is to be found in a well-regulated sanatorium where the chorus of coughing is far less than that which greets the ear in railway carriages, restaurants, theatres, and churches. But relatively much more sputum is expectorated in sanatoriums than in public places. Patients who are taught to control their cough or to cough only at certain specified times soon become aware that sputum may be expectorated at the proper time with at the most a gentle "clearing of the throat," and that explosive coughing is not necessary. One of the important tasks which fall to the lot of the sanatorium physician is to teach the patients under his care to avoid useless coughing with its harmful increase in pulmonary movement and its grave risk of introducing infection into the sound lung. In other words, the physician has to teach the patient to recondition the cough reflex, and to allow the cilia to do the work which they are constructed to perform—i.e., to remove all harmful matter from the alveolar and bronchial tracts. The morning cough, prolonged to the point of vomiting, almost universal in patients suffering from pulmonary complaints and frequent in

inveterate smokers with no pulmonary lesion, is due to a collection of viscid mucus on the posterior pharyngeal wall. This tenacious secretion has been brought up overnight by ciliary action from the bronchial tree or has been excreted from the chronically inflamed mucous membrane of the pharynx. In either case the effect is the same—namely, to stimulate the cough reflex and sometimes the vomiting reflex. This cough can therefore best be relieved by a warm alkaline drink designed to render the mucus less viscid and to clear the pharyngeal wall. Dr. HILL'S work itself suggests some clinical applications. If ciliary action is more rapid in the horizontal position than in the vertical the process of expectoration without cough should be accelerated by recumbency, provided, of course, that no other factors such as cardiac lesions preclude this posture. If ciliary action is accelerated by stretching the mucous membrane of the trachea and bronchi, extension of the head and neck might assist the expectatory process. In any case it would be worth while to test the effect of physical agents and drugs, locally applied or internally administered, on the rate of ciliary movement in the human bronchial tree.

THE FOUR PLAGUES OF EGYPT.

FEW persons not directly concerned realise the difficulty and importance of the Egyptian problem. It came to birth with the opening of the Suez Canal, when the growing Empire found an imperfectly organised population across its vital trade-route. It reached a baleful adolescence in the days of the Dual Control and the occupation, and at the time of GORDON'S death it filled the English horizon. The genius of CROMER, MILNER, and KITCHENER kept it within bounds until 1914, but while the Empire was at war the Egyptian problem grew apace. The time for repressive measures had passed, and the remedy was tried of giving the country the utmost possible degree of autonomy. But against peace along these lines is the necessity of maintaining sufficient force in the background to protect the Canal and the European interests in Egypt if anarchy should command the situation. Politically the Nile Valley remains a flood that may burst its banks at any moment, and there are only flimsy barriers in the way of its disruptive power.

The peculiar bitterness of the Egyptian populace as a whole against Europe is due to the fact that while her Western neighbours have attained to a real civilisation, Egypt has never since the great days of the Pharaohs achieved more than a shadow. The apparent modernity of Egyptian institutions is a cloak held by various Western interests over one of the most ignorant and downtrodden peoples in the world. If the country were left to itself its railways, hotels, and most of its commerce would disappear in a few years. There are probably many reasons for this failure to become civilised, but none can be more important than that advanced by Dr. J. B. CHRISTOPHERSON in his presidential address delivered on Nov. 1st to the Section of Tropical Diseases and Parasitology of the Royal Society of Medicine. It is impossible to have a sound mind in an unsound body, and Egypt is physically rotten. The foreigners and educated classes together, says Dr. CHRISTOPHERSON, do not number more than half a million, and the vitalising element of the country is the fellahin, the agricultural population of 14 millions. This huge class is practically illiterate, is ground down in the mud of its cultivations by tyranny great and small, and is ravaged by the four plagues of bilharzia, hookworm, pellagra, and ophthalmia. Dr. CHRISTOPHERSON might have added to this list diabetes and sexual perversion, both of which are widespread. Bilharzia and hookworm are traceable directly to the river and the soil from which the race springs; pellagra is presumably a food-deficiency disease, and the ophthalmic infections are spread by flies which breed in the dirt of the villages. Probably 75 per cent. of the nation suffer from bilharzia, and the four plagues together account, in Dr. CHRISTOPHERSON'S opinion, for one-third of all the deaths. These afflictions impose on their hosts a hopeless mental and moral handicap; they undermine self-confidence and manhood and make their victim ineducable and uncivilisable. The proof of this is in the incredible change that comes over the fellah who is cured of them. Dr. CHRISTOPHERSON describes the ordinary untreated peasant as a man of good physique with a somewhat hang-dog expression, a pale, sallow, muddy complexion, not over-clean or tidy, cruel, unreliable, impulsive, fanatical, and easily influenced to criminal acts. He has no ambition, and his habits are those of 2000 or 10,000 years ago. The "nafr" in the Egyptian Army, who is nowadays kept free from his endemic diseases, is a fine worker, capable of steadiness and devotion, possessed of a very keen sense of humour and an original talent for impromptu acting. The Church Missionary Society recognise that no amount of educative effort is of any use until these diseases are eradicated, and at their hospital in Old Cairo 13,167 persons were cured during 1926 and 1927. The possibilities of a hookworm campaign are reviewed on p. 992 of our present issue.

Dr. CHRISTOPHERSON'S conclusion, that Egypt's need is not so much for law or for the material benefits of civilisation, as for physicians to cure her four plagues, will be endorsed by everyone with practical experience of the country. They are for her the root of all evil. If the fellah had a healthy body he would be educable; if he were educated he could be civilised and politically enfranchised as nowadays, whatever the appearance of things may be, he certainly is not. If he were civilised he could be left in charge of his own country without the constant suspicious supervision that seems indispensable to-day and is so irksome and humiliating to those Egyptians who wish to fulfil their obligations to the West. Truly, he who will cure the four plagues may have of Egypt anything he wishes.

POST-OPERATIVE THROMBOSIS.

Post-operative thrombosis is at best a nuisance and at worst a serious and dangerous sequel to surgical operations and childbirth. Its underlying cause or causes and the precise mechanism by which it is produced have never been satisfactorily explained; all that has been fairly certain is that it is more likely to occur in older than in younger people and after extensive rather than slight operations, and especially in those involving the abdomen. Behind all the statistics of its incidence is the difficulty that small clots may occur without any symptoms at all and as, once started, a thrombus propagates itself, its size and destiny are to some extent accidental; hence the occurrence of white legs or pulmonary emboli may not be a very satisfactory guide to the conditions underlying post-operative thrombosis in general. Recent work[1] in Prof. E. E. GLYNN'S laboratory in Liverpool, begun by Dr. W. HOWEL EVANS and

[1] Jour. Path., Bact., 1928, xxxi., 833.

carried on with Dr. F. EARLAM and Dr. R. Y. DAWBARN, seems to throw a good deal of light on its immediate mechanism and holds out some prospect that its basal cause may be soon discovered and something done to prevent it. That blood platelets have an intimate relation with clotting has been shown in a variety of ways; W. CRAMER, for example, found that filtered plasma would not clot, L. ASCHOFF and others have observed that an accumulation of platelets was anatomically the basis from which an intravitam thrombus grows, and J. TAIT has recently pointed out that threads of fibrin may actually be seen to form along the tracks of particles emanating from platelets. The Liverpool workers show from the examination of a number of normal and diseased persons that clotting time, as measured outside the body, varies inversely with the number of platelets counted in the circulating blood; diminution of platelets is even more plainly associated with failure of the clot to retract. Frequent counts on 50 surgical cases revealed the new fact that after operations the number of platelets in the blood begins to rise about the fourth day, increases to a maximum about the tenth day, and thereafter falls slowly back to the normal level. It can hardly be a coincidence that clinical thrombosis and embolism most frequently appear about the tenth day after operation. The extent of the rise varies widely; in one case it was absent and in a good many quite small. In the greatest increase the platelets were two and a half times as abundant as they were before operation; on the average they increased by about 50 per cent. Analysis of the individual cases shows that the more substantial rises occurred after the larger operations, but apart from this, no connexion with any particular operation is obvious, nor does the age of the patient seem to be important. Much the same was found in 28 cases of childbirth; six showed no significant platelet rise, but the average increase was to 240 per cent. of the prelabour level and the largest to 470 per cent. The combination of operation and delivery in five cases of Cæsarean section gave even more marked increases. Control observations show that the platelets are not influenced by stopping in bed, by anæsthesia, or by simple hæmorrhage; with sepsis they may either fall or rise. These items of surgical operations being excluded, it is not a little suggestive to find that platelets also increase after fractures and during convalescence from lobar pneumonia. The feature which is common to these various circumstances is tissue injury, and if the suggestion that the absorption of breakdown products is the immediate stimulus is correct it remains to discover how it influences the platelets; possibly the normal activity of the spleen in destroying them is depressed. This interesting work includes at present no practical directions for avoiding post-operative thrombosis, though examination of the blood about the sixth day might show in which patients it was likely to develop, any count of 750,000 or thereby being a sign of danger. Lytic sera or some other agent which destroys platelets suggest themselves as possible remedies, but they might be dangerous, for platelets are particularly effective in promoting clotting when they disintegrate. Again, some means of stimulating the spleen to greater activity may be found, and it may be that the preventive effect which some surgeons attach to bodily exercises may be due as much to promoting the splenic circulation as to quickening the general blood flow. However, the matter will doubtless receive the further investigation which it deserves and the Liverpool observations certainly indicate a line along which prevention may be hopefully looked for.

Annotations.

"Ne quid nimis."

THE LORD MAYOR'S SHOW.

THE programme of the Civic Procession which is to pass through the streets of London to-day, Friday, contains welcome evidence of the growth of public interest in health and social welfare. Industry as represented by the City Guilds has long been a prominent feature of the Lord Mayor's Show, but the wider aspects of public hygiene have never before been presented on this scale. The National Milk Publicity Council is sending a car, drawn by a team of four Suffolk Punches, representing milk as a health promoter. An immense milk bottle in an appropriate setting is surrounded by children dressed to represent the food fairies in the milk. Two cars are arranged and shown by the Industrial Welfare Society, which encourages the study of questions affecting the welfare of workers engaged in industry, and assists and advises employers on starting and improving schemes for the welfare of their employees. The Health and Cleanliness Council in its exhibit contrasts the clean and the dirty home. Finally, the King Edward's Hospital Fund for London is represented by a car illustrating the progress made in the cure of disease and in the care and treatment of the sick, culminating in our great voluntary hospitals as we see them to-day. A mediæval apothecary is first shown at work in his laboratory. There follows a section of an up-to-date children's ward, with a child undergoing sunlight treatment. London is beginning to take its health conscience seriously.

LATE RESULTS OF OPERATIONS FOR GASTRO-DUODENAL ULCERATION.

AT this year's congress of the Association Française de Chirurgie there was a brisk discussion [1] on the late results of surgical treatment of ulcers of the stomach and duodenum, and it is interesting to compare the opinions there expressed with those held by authorities in this country. In reviewing his experience of so-called radical resection methods and indirect methods, which include gastro-enterostomy, gastro-duodenostomy, and enervation of the stomach, Mr. J. Okinczye pointed out that from time to time we must reconsider whether a peptic ulcer is to be regarded as a local condition or as the expression of a general disease. Is it logical to speak of gastric resection as radical treatment? He believes that surgery can only claim to palliate the local manifestations of the disease, and that no operation at present executed can be selected either for its intention or its results to the exclusion of all others. Most of them seem to be rewarded with a certain measure of success, and the conditions of failure are veiled in obscurity. Possibly the results depend in some way upon the state of evolution of the disease at the time of intervention; symptoms seem to follow a cycle, and operations towards the end of this cycle might well prove more successful than at other times. Too little, however, is known of the factors influencing the course of the disease to enable us to choose the most propitious moment for surgery, and Okinczye's conclusion is that the most important indication for operating is the failure of relief from medical treatment pursued for a reasonable time. The seat of predilection for ulcer, he suggests, seems to be the pyloric antrum, but sometimes a functional disturbance of this area pushes the disease (as it were) into the duodenum, or, after gastro-jejunostomy, perhaps into the jejunum. Should this view be accepted duodenal ulcer must be looked on in the light of a complication of a trouble which has its centre primarily in the stomach. If so, it is

[1] See Presse Méd., Oct., 1928.

rational to attack the stomach in seeking to cure the duodenal lesion, and in fact Okinczye reports 78 per cent. of good late results from resection operations compared with 66 per cent. for gastro-jejunostomy. A mortality of 13·6 per cent., however, was associated with the former. At the same meeting Mr. X. Delore, of Lyons, declared that gastro-jejunostomy is a very satisfactory method of treatment for duodenal ulcer, giving 70 to 80 per cent. of good late results. But gastro-duodenectomy, he considers, is followed by a higher percentage of permanent cures. In 62 cases of duodenal ulcer 28 gastro-duodenectomies (45 per cent.) were performed with one death, whilst gastro-jejunostomy was performed in the rest. Thus, while he regards gastro-duodenectomy as the method of choice there remains a large field for gastro-jejunostomy, the results of which are improved if the duodenal ulcer is excised or cauterised locally. On all these questions there is little unanimity, as is illustrated by the interesting experience of Prof. Henri Hartmann.[2] Surgeons in this country are almost all agreed that for an ulcer of the lesser curvature gastro-jejunostomy is not very suitable, yet Prof. Hartmann is strongly in favour of such an operation, when it is of the posterior type and the anastomotic opening abuts on the greater curvature of the antrum. The mortality, he says, is about one half that of gastric resection, and this very largely compensates for the fact that resection gives better immediate results.

[2] Chirurgie de l'Estomac. Paris: Masson et Cie. 1928.

PIRATE SURGEONS.

ON Nov. 7th, before the Historical Section of the Royal Society of Medicine, an address on Pirate Surgeons was given by Dr. Philip Gosse, who is well known as the greatest, or possibly only, living authority on the exciting topic of piracy. He opened his remarks by explaining that the title chosen had apparently caused some misapprehension in certain quarters, and he earnestly reassured his hearers that he had no intention of mentioning the names of any living persons. His remarks were concerned with the medical men who, in the seventeenth and eighteenth centuries, sailed with the buccaneers and pirates to stitch up their wounds and trim their beards. He included the buccaneers, although these were not, strictly speaking, pirates, but the distinction was often so slight that it seemed unnecessary to differentiate between them. Actually the buccaneer who was British, French, or Dutch, practised his adventurous craft in the Spanish-American seas, and preyed upon Spaniards only. The pirate proper, on the contrary, took a wider view of his profession, and in his own words "waged war upon the whole world," irrespective of nation or kinship. One of the chief of the pirate surgeons was Captain Thomas Dover, an amazing character who remains immortalised by the diaphoretic powder attributed to him; he sailed the seas, if not as a pirate captain, as a very open-minded privateer, and was the author of a medical "best-seller" entitled "The Ancient Physician's Legacy to His Country," in which he claimed that almost every ill to which the human body was subject could be cured by copious draughts of metallic mercury. He also sacked Guayaquil in Peru, cured 172 sailors of plague, and rescued Alexander Selkirk: and yet, in spite of all this, so distinguished a Member of the Royal College of Physicians failed to achieve the honour of becoming a Fellow. Amongst the less well-known surgeons was Lionel Wafer, who also wrote a book, describing his hardships and adventures crossing the Isthmus of Panama in 1681 with some other mutinous buccaneers. Wafer got left behind in the jungle and was captured by a none-too-friendly chief, but owing to his skill in bleeding one of the chief's wives he became the inseparable companion of the delighted potentate. Alexander Exquemeling, the Flemish barber-surgeon, was the author of a remarkable work, "The History of the Buccaneers of America," 1684, which gives a lucid but accurate account of the doings of those extraordinary "brothers of the coast." Dr. Gosse then spoke of some of the lesser lights, such as Dr. Bullock, who took part in the plundering of a Spanish-American town, but becoming drunk, was left behind in the retreat to the ships, to be captured and afterwards to become a popular practitioner of medicine and "civilly entertained especially by the women" in the same town. Then there was Richard Jobson, who tired of the dull routine of a druggist's assistant in London, and ran away to sea to become a buccaneer, which he combined with the study of divinity, carrying always with him "a Greek testament which he frequently read and would translate extempore into English to such of the company as were disposed to hear him." A less lovable pirate was Dr. Peter Scudamore, surgeon to Captain Bartholomew Roberts, of the *Royal Fortune*. He did many things unbecoming to one of his learned profession, as stealing the surgical instruments belonging to a brother surgeon, and, what gave even greater offence, a backgammon board from a fellow pirate. He could talk the Angolan tongue, and was caught red-handed attempting to foment a mutiny amongst a hold-full of stolen slaves. At last the gallows claimed him, when he died penitent but unregretted, at a wholesale hanging of pirates at Cape Coast Castle in 1722.

As the lecturer pointed out, the glimpses of the adventures of the surgeon aboard a pirate vessel were all too brief, and it was only occasionally that the veil was lifted for a moment to show us something of the lives of these obscure practitioners of surgery.

BORNA DISEASE.

AT a time when a great deal of attention is being paid to acute infections of the central nervous system in man, more than usual interest attaches to the publication by the Medical Research Council of a special report[1] on a form of encephalomyelitis in sheep and cattle, which goes by the name of Borna disease. The condition is fortunately still unknown in the British Isles, so that the studies here presented have no immediate application in this country; but every addition to our knowledge of the viruses which attack the nervous system and of the changes to which they give rise in the brain and spinal cord is valuable at present.

The investigations here described were made by Mr. S. Nicolau and Mr. I. A. Galloway, working as guests at the National Institute of Medical Research at Hampstead. The disease concerned has been known, under several names, for more than a century as an enzoötic and epizoötic affection of horses, cattle, and sheep, and during the last few years various workers have shown that it is attributable to a filter-passing virus, and that pathologically its most distinctive feature is the presence in the ganglion cells of the hippocampal gyrus of certain "inclusions," referred to as Joest-Degen bodies. The transmission of the disease under natural conditions is probably by the respiratory tract or by ingestion. From the experiments now recorded and from earlier work it appears that the virus of Borna disease has properties common to the viruses of vaccinia, herpes, rabies, and poliomyelitis—the "neurotropic ectodermoses" of Levaditi. Under favourable conditions it passes through bacteria-proof filters, and through collodion ultra-filters which permit the passage of colloidal particles of large dimensions; after centrifugalisation for 15 minutes at 5400 revolutions per minute the supernatant fluid remains infective; it is resistant to the action of glycerine, but is sensitive to desiccation, ultra-violet light and heat, and is destroyed by ether, chloroform, and formalin, and it has not been propagated in vitro. Rabbits can be infected experimentally with the virus by intracerebral or intrathecal

[1] Borna Disease and Enzoötic Encephalo-myelitis of Sheep and Cattle. By S. Nicolau, D.Sc., and I. A. Galloway, B.Sc., M.R.C.V.S., Medical Research Council, Special Report Series No. 121. London: H.M. Stationery Office, 1928. Pp. 90. 5s.

inoculation, by inoculation into a peripheral nerve (sciatic), or into the anterior chamber of the eye, and also—in animals whose brain or meninges have been irritated by normal saline or serum—by application of virulent material to the scarified skin. The presence of the virus in the brain, spinal cord, peripheral nerves, parotid, and adrenal glands of rabbits dead of the disease has been demonstrated by the injection of portions of these organs into the brains of other rabbits. Monkeys have been inoculated intracerebrally and have developed encephalomyelitis after a very long incubation period (33–71 days); and in one animal the symptoms resembled those of poliomyelitis. Pathologically Borna disease resembles poliomyelitis, herpes encephalitis, and human epidemic encephalitis in the infiltrative character of the lesions. In the experimental rabbits perivascular and parenchymatous infiltration by mononuclear cells was found throughout the central nervous system, and there was also an interstitial infiltration in the peripheral nerves and very intense inflammatory changes in the dorsal root ganglia. Satellitism and neuronophagia of the ganglion cells were widespread if not very intense. In the monkey the findings were similar, but the incidence was less upon the spinal cord; the characteristic intracellular Joest-Degen bodies were found in many parts of the brain. A solid immunity against Borna disease can occasionally be obtained in the rabbit by inoculating suitably attenuated virus into the brain, and immunity has also been produced by multiple intravenous injections, by corneal scarification, and by intratesticular inoculation with fresh virulent material.

The viruses which attack the central nervous system may be divided into two groups according to the type of pathological change to which they give rise. On the one hand, there are those which excite considerable infiltrative interstitial reaction, such as the viruses of poliomyelitis, encephalitis lethargica, herpes, and rabies; on the other, there are those which cause perivascular demyelinisation with little infiltrative reaction, the best known being that associated with vaccination. The virus of Borna disease is now placed in the former group, and this work of Nicolau and Galloway has widened our knowledge of the group as a whole. One fact which they have proved is that when virus is inoculated into the brain it may spread not only throughout the central nervous system but also into the peripheral nerves; this is probably a general rule for viruses of this group. These same workers have shown that it is true in the rabbit for the viruses of rabies and herpes, and in man it is known that poliomyelitis may give rise to infiltrative lesions in the peripheral nerves and dorsal root ganglia, though the actual presence of infective material in these situations has not, to our knowledge, been demonstrated. In the particular case of Borna disease the virus, spreading peripherally, strikes severely at the posterior root ganglia, and there is an argument by analogy that herpes in man may also be a central infection spreading peripherally and producing its most intense effects on the posterior root ganglia, the central parts of the nervous system having greater powers of defence against it.

THE SEMON LECTURE.

THE evolution of laryngo-rhinology has followed a course which might have been predicted. On looking backwards it is easy to realise the errors into which it has fallen and the dangers to which it has been exposed, and as all special branches of medicine are in their infancy exposed to similar dangers, the progress of this one may serve as a guide and an example to younger specialties. After sporadic and uncertain attempts by various pioneers extending over a century, Manuel Garcia in 1854 was the first to obtain a satisfactory view of the interior of the larynx and, by presenting a paper on the subject to the Royal Society of London, became the founder of laryngology. Czermak, of Pesth, and Türck, of Vienna, developed the method, and the latter city became, and has ever since remained, a great centre for the study and teaching of the allied sciences of laryngology and rhinology. Last week Prof. Markusz Hajek, of Vienna, came to London to deliver the Semon lecture and received an enthusiastic welcome from his old pupils and from his numerous friends and admirers in this country. He took as the subject of his lecture Laryngo-Rhinology and General Medicine, and he pointed out, with a wealth of illustration drawn from his long experience, the pitfalls which have beset the path of his specialty. At first the new discovery was followed by a rapid improvement in technique and by the invention of numerous instruments of examination and treatment, and the result was a tendency for laryngology and rhinology to become divorced from general medicine. An instance of this was the indiscriminate local treatment of tuberculous laryngitis which followed in some quarters the pioneer work of Heryng and Krause in this field. This phase has now happily passed, and all laryngologists agree that the most important part of the treatment is that of the general affection, and that local treatment of tuberculous laryngitis should only be carried out in close coöperation with the physician. The danger now, he thinks, comes rather from the opposite direction, and is that clinical diagnosis may be pushed into the background by laboratory methods. There is a tendency to rely too greatly on all kinds of examinations, histological, bacteriological, and serological, and a consequent danger that the clinical acumen of the experienced practitioner may not be given the full scope formerly accorded to it. These laboratory methods are of great value and importance, but they also are subject to fallacy, and the clinician should be guided but not ruled by them.

GAS ATTACK ON RATS.

RAT week is a suitable time to refer to recent work on the use of cyanogen compounds for destroying these troublesome rodents. An investigation [1] has been made at the New York Quarantine Station by Surgeons C. V. Akin and G. C. Sherrard, in order to determine the relative efficiency of these products from the standpoints of (1) lethal efficiency, (2) safety to fumigators and to others, and (3) cost. Cyanogen compounds are dangerous things to handle, and not long ago the Prefect of the Seine forbad [2] the use of hydrocyanic acid for the destruction of vermin in houses, where the use of selective poisons or of virus is the method of choice. But ships are not houses, and they are in many ways specially adapted for treatment by fumigation. Moreover, the destruction of rats in ships is even more important than in houses, since rats entering ships from plague-infested ports may introduce this disease into other ports.

The New York investigators studied the action of liquid hydrocyanic acid (about 98 per cent. HCN), both alone and containing 20 per cent. of cyanogen chloride (tear gas) added to serve as an indicator, to the fumigator or other humans entering the treated space, of the presence of residual traces of gas. They also worked with the gas generated from sodium cyanide in situ by the addition of mineral acid, also using a mixture of sodium cyanide and chlorate to yield, when acidified with hydrochloric acid, hydrocyanic acid with a small proportion of tear gas. Further they tried a German preparation, Zyklon-B, of hydrocyanic acid adsorbed on "diatomite"—a silicious material similar to keiselguhr—and made pungent by the addition of chloropicrin, as well as a preparation of calcium cyanide containing free hydrocyanic acid ($CaCy_2$, 2HCN), which yields its hydrocyanic acid on exposure to moist air and carbonic acid. The solid products are sold in air-tight cans or pails, and as they, especially the calcium cyanide, are finely divided, care must be exercised in

[1] Public Health Reports, vol. xliii., No. 41, Oct. 12th, 1928. Comparative Efficiency of Cyanogen Products used in Fumigation.
[2] See THE LANCET, 1928, i., 1340.

distribution so that the residual material left after fumigation can all be removed from the ship's hold or other compartment. Spreading in thin layers on paper is recommended. It was found that rats, which were all of one breed, varied considerably in their resistance to the poison, and no opinion could be offered as to the relative susceptibility of these rats and wild rats. They were usually placed in cages at both floor and ceiling level in the test-rooms in which a standard dosage of 2 oz. of HCN per 1000 cubic feet was used as a rule. Diffusion of the gas was found to be slow, which, having regard to the small difference between its density and that of air, is not surprising. Also, as the gas is slightly lighter than air, the rats at ceiling level succumbed sooner than those on the floor. The authors say: "It is a well-known fact that rats escape cyanide fumigation as fumigation is usually done, and the reason for this becomes clear when it is seen that a lethal quantity of the gas will not flow through small openings into tightly closed sections not primarily exposed to the gas. The practical proof of this was witnessed on shipboard when test animals, concealed in the covered bilges, closed drawers, and similarly tight compartments, were unaffected by standard amounts of cyanide during the course of a two-hour fumigation." The importance of careful preparation of a ship before fumigation is therefore obvious.

Experiments showed that the residues of the solid preparations, more especially from calcium cyanide, should be removed with great care to avoid danger. A concentration of one-tenth of an ounce of hydrocyanic acid in 1000 cubic feet of air, in the opinion of the authors, "must be considered as dangerous to human beings exposed over a long period of time, and they also suggest that rats which are well enough protected in living quarters to escape a dose of 1 oz. of HCN per 1000 cubic feet will also survive a two-hour exposure to the standard dose." The lethal efficiency of liquid acid is much greater than that of gas generated from cyanide in situ and still more so than that of calcium cyanide. Zyklon-B is very effective —obviously it is in effect liquid acid. The conclusion was forced on the authors that less than the theoretical amount of gas was evolved into the air from sodium cyanide by the agency of mineral acids. A wise note of warning is struck in respect of the absorption of hydrocyanic acid by bedding, mats, rugs, &c., which are not dry and which are best removed before operations commence. Conversely the protective effect of layers of damp sacking or similar materials on rats hiding under them should be considered, as it is very great. "If managed with due care and proper respect," the investigation concludes, "hydrocyanic acid is the best of all fumigants for rodents. Careless use of it will be attended with human fatalities, but it will kill rats under conditions that the use of sulphur cannot meet; and it is obvious that if fumigation does not kill rats, time and money are wasted." Incidentally, it kills those minor horrors of life at sea—cockroaches, bugs, and the like. At well-equipped fumigating stations with a highly-trained personnel liquid acid will be found the best agent to use. For smaller ones Zyklon-B has advantage. The liquid acid is not a very safe substance to convey on account of some tendency to undergo violent decomposition, and should not be sent by common carrier. The lessons learned in the course of the experimental work covered in this report point insistently to one conclusion: *Fumigate fewer ships better.*

DAWSON WILLIAMS MEMORIAL PRIZE.

AT the general meeting of subscribers to the Dawson Williams Memorial Fund, held on July 10th last under the chairmanship of Sir Humphry Rolleston, it was resolved that the sum subscribed to this memorial should be devoted to a prize in pædiatrics, to be awarded every two years or at longer intervals, and that the scope of the prize and the details of its adjudication should be left to the discretion of the trustees, with the assistance of such other persons as they might wish to consult. The following have agreed to act ex officio as trustees: the Presidents (for the time being) of the Royal College of Physicians of London, the Royal College of Surgeons of England, the British Medical Association, the Royal Society of Medicine, the Section for the Study of Disease in Children (R.S.M.), and the Editor of the *British Medical Journal*. The Medical Secretary of the British Medical Association acts as convener and secretary of the trusteeship, and the first meeting of the trustees was held at the House of the Association on Oct. 19th, with Sir John Rose Bradford, P.R.C.P., in the chair. It was decided to ask the Charity Commissioners to accept for investment the sum of £849 now in hand, to receive all interest accruing therefrom, and to pay this over to the trust account at the bank for the purposes of the Fund. In pursuance of the resolutions of the meeting on July 10th it was resolved that the Dawson Williams Memorial Prize should take the form of an award for the best work done in pædiatrics during the five years immediately preceding the date of the award; that any registered medical practitioner in the British Empire should be eligible for the award; and that the first award, to be made by the trustees in July, 1930, should consist of a cheque for 50 guineas.

PAY BEDS IN LONDON HOSPITALS.

FIVE years ago [1] we published a list of 13 general hospitals in London which provided accommodation for patients of moderate means. It contained the names of three hospitals with medical schools attached, providing between them 108 pay beds, and ten other hospitals, mostly general, with resident medical officers, providing between them 213 pay beds. In the report of the special committee on pay beds of King Edward's Hospital Fund for London, published in July, 1928, the first of these two groups contained the names of six hospitals, providing 164 beds, and the second the names of 22 hospitals, providing 358 beds. It is true that the area surveyed by the special committee was much wider than that covered by our own inquiries, which made no claim to be exhaustive, but even so the increase that has taken place in hospital accommodation for paying patients during the last five years is significant. It has a bearing on a doubt, expressed by the special committee referred to above, as to whether the nature and extent of the existing pay-bed accommodation at voluntary hospitals is generally known by members of the middle and professional classes. The committee suggested that King Edward's Hospital Fund might well consider the wisdom of preparing and publishing year by year, for the information of the public, a list of the pay beds at the London voluntary hospitals, with rates of charge and other particulars. We are informed that the management committee of the Fund are at present considering this recommendation and would be glad to know whether a list such as is included in the appendix of the report of the special committee, if prepared and issued annually, would be likely to be of use to the public and the medical profession throughout the country. It seems to us clear that it is of the utmost importance for practitioners to be kept up to date with developments of this kind, and we would urge the Fund to proceed with arrangements for the annual issue of such a list. The appendix to the report includes also particulars of 22 general, cottage, and other hospitals without resident medical officers who admit paying patients, 8 hospitals for women, and 24 other special hospitals. As further evidence of the importance of an annual supplement to the information here provided is the information that of the teaching hospitals not hitherto providing pay beds the Middlesex, St. Bartholomew's and St. Mary's have schemes for establishing such beds, while St. Thomas's, the Royal Free, King's College, and Westminster Hospitals propose to add considerably to the number of private wards at present available. Many other extensions of this sort to general and special hospitals are contemplated, and

[1] THE LANCET, 1923, ii., 1000.

it seems certain that an annual list will be not only of great practical use but will be a valuable index of the trend of hospital administration in London.

A GREAT PHARMACIST.

PHARMACY has suffered a heavy loss by the death in his sixty-third year of Mr. Edmund White, which occurred at his home at Putney on Nov. 3rd. It is no exaggeration to say that Mr. White was the greatest pharmacist of his day and generation. There have been pharmacists with a wider range of scientific knowledge than he possessed and pharmacists with a larger place in the sphere of business, but it is doubtful if there has been in our time another pharmacist in whom the learning of the schools and the wisdom of the market-place were so happily blended. Possessing this valuable combination he gave his services to the craft in which he was reared, although he must have been tempted at times to utilise his qualities in fields where the prizes are more plentiful and the work less exacting. To-day it is by no means uncommon for a pharmacist to graduate in science at one of the universities, but in the days when White took the degree of Bachelor of Science it was an unusual if not a novel achievement for one of his calling. Before that, he had obtained during his apprenticeship days the Bell Scholarship which entitled him to a free course of instruction in the Society's School of Pharmacy, an institution which has been foster-mother to many men who have since gained distinction in other vocations. At the completion of his courses he obtained the Pereira medal, the most coveted prize offered to pharmaceutical students, and after that he stayed for a time at the school working as a demonstrator. From there he went to St. Thomas's Hospital as chief pharmacist, where he remained for a long period, acting at the same time as one of the Pharmaceutical Society's examiners. He was elected a member of the Council some years before the outbreak of war and held the office of President during the war years. His services to his country during that exacting period were of great value; his position as head of a venerable organisation equipped with resources for research work and even, at a crisis, for carrying out manufacturing processes enabled him to throw himself and the Society with him into the work of producing some of the drugs and chemical reagents, for our supplies of which we had until then depended upon continental sources. Those who were associated with him in those days will recall the eagerness with which he set to work on this important task. Too old for service in the field, he fought the good fight in the arena for which he was so admirably accoutred. We are told that on the very day war was declared he spoke with his colleagues very strongly of the desirability of voiding enemy patents, and although we cannot go so far as to say that it was he who suggested the policy eventually adopted by the Government in this matter, it is clear that he was one of its earliest advocates. The importance of Mr. White's life work vis-à-vis the medical profession lay in his constant advocacy of higher and higher education for pharmacists. He was of the school which believes that pharmacy is the handmaid of medicine and that the true rôle of the pharmacist is to study the science of drugs. It was his view, and he persisted in it in the teeth of the most obstinate opposition from the commercial school, that the pharmacist's proper function could not be performed unless he had a good educational foundation, and unless on that groundwork there was erected a specialised structure of a much more enduring nature than that which passed muster a few years ago. He succeeded in convincing his colleagues to that end, and the pharmaceutical student to-day will find it very difficult to obtain registration as a pharmacist unless he works hard and systematically. The day of "cramming" for the qualifying examination has gone; for this the thanks of the medical profession are due to Edmund White more than to any other man. A closing word should be said concerning his views on the production of the British Pharmacopœia; he held that if the pharmacist was more highly educated he should be more highly esteemed both by the medical profession and the public. That is to say, he stood out, to use a colloquialism, for due recognition for the pharmacist whether he was in his shop or helping to revise the Pharmacopœia. As a corollary, if pharmacists through their Society gave valuable assistance to the General Medical Council in the work of producing the Pharmacopœia, that work should be recognised in a more conspicuous way than had been customary in the past. Edmund White was the Pharmaceutical Society's representative on the Commission for the Production of the British Pharmacopœia, and no better one could have been chosen.

GENERAL MEDICAL COUNCIL ELECTION.

THE result of the voting for two Direct Representatives for England to be members of the General Council of Medical Education and Registration in the place of the late Dr. J. A. Macdonald and of Sir Robert Bolam, who has been appointed to represent the University of Durham, is as follows:—

Ernest Kaye Le Fleming, M.R.C.S. ..	.. 11,455
John Wardle Bone, M.B.	.. 11,340
Gordon Reginald Ward, M.R.C.S. ..	.. 4,262
Edward Andrew Gregg, L.R.C.P. ..	.. 3,108

The constituency numbered 32,758 (as compared with 29,179 at the 1924 election), of whom 15,082 (last time 15,229) took part. The proportion of those taking no part was thus rather more than one-half of the possible voters, suggesting that interest in the election was notably less than four years ago. The number of invalid votes received was 720. Only 368 voting papers, or 1·12 per cent. of the whole number, were returned as dead letters. An effort will be made by the Registrar of the Council to get into touch with all practitioners whose papers have been returned in this way before their names are erased from the Register under Section 14 of the Medical Act, 1858.

The next session of the Council will commence at 2 P.M. on Nov. 27th, when the President, Sir Donald MacAlister, will take the chair and give an address.

Sir Wilfred Grenfell, F.R.C.S., of Labrador, has been elected Lord Rector of the University of St. Andrews.

THE Secretary of State for Scotland has appointed Dr. John Parlane Kinloch, medical officer of health of Aberdeen and head of the Public Health Department of Aberdeen University, to be Chief Medical Officer in the Department of Health for Scotland which on Jan. 1st will take over the powers and duties of the Scottish Board of Health.

THE Council of the British Institute of Radiology incorporated with the Rontgen Society has decided to hold a special meeting at the opening of the new session on lines similar to the meeting last year, when the new body was inaugurated. The date has been fixed for Thursday and Friday, Nov. 15th and 16th, and besides the presidential address by Mr. G. W. C. Kaye, D.Sc., papers have been promised by Prof. W. L. Bragg, F.R.S., Sir Thomas Horder, Mr. W. Sampson Handley, Mr. A. J. Walton, Mr. G. Shearer, D.Sc., and others whose work is connected with radiology. Most of the meetings will be held at the Central Hall, Westminster, and there will be an exhibition of X ray and allied apparatus which is said to include exhibits by all the British firms engaged in this industry. The proceedings will not be open to the general public, but anyone who is practically interested in radiological work is invited to attend. The Director of the Institute, Dr. J. Muir, 32, Welbeck-street, London, W. 1, will be pleased to give any information desired. The Mackenzie Davidson Memorial Lecture will be delivered by Prof. Bragg, at 8.15 on Nov. 14th, at the house of the Royal Society of Medicine, 1, Wimpole-street, W. The subject is X Ray Optics.

The Clinical Interpretation of Aids to Diagnosis.

A Series of Special Articles contributed by Invitation.

X.—THE INTERPRETATION OF THE BLOOD COUNT.

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Part II.*—The White Cells.

In this country the term leucocyte is usually regarded as embracing all the varieties of white cells; in America there is a tendency to confine the use of the term to polymorphonuclear cells. To avoid confusion it is safer to use the term "white cells" to cover all classes, reserving the term leucocyte for special application.

The White Cell Count.

Knowledge of the total number of white cells per c.mm. of the blood is of the utmost importance in the diagnosis of a number of conditions, but it is of very little use unless the relative percentages of the various classes of cells is also known. The total and differential counts will therefore be considered together.

There is no fixed normal figure for the total number of white cell in the circulating blood. Their numbers are subject to physiological variations depending upon exercise, upon the stage of digestion, and even fluctuate throughout the day without apparent reference to any particular cause. Variations of 1000 or more per c.mm. in the same patient on different days need then excite no surprise. The following table must therefore be regarded only as a rough guide to the limits of variation in the normal person.

White Cells of a Normal Person.

Total No.		5500 to 8500 per c.mm.
Polymorphs	Neutrophile	60 to 75 per cent.
	Eosinophile	0 to 2 per cent.
	Basophile	0 to 1 per cent.
Mononuclear	Lymphocytes	25 to 40 per cent.
	Monocytes	2 to 7 per cent.

In normal healthy adults the white count will usually be found to lie somewhere between 5500 and 8500 per c.mm. Figures above or below these, however, need not be regarded as necessarily abnormal. A decrease is spoken of as a *leucopenia*, an increase as a *leucocytosis* or *lymphocytosis* according to the type of cell involved. Before going into the question of variations in the total numbers it is necessary to consider the types of cells.

Types of White Cells.

Normally five classes of white cells are found in the blood. These fall into two divisions, those with lobed nuclei and those without. The first are spoken of as polymorphonuclear, the latter as mononuclear cells.

In the *polymorphonuclear* order, the cells, according to the nature of the granules in the cytoplasm, are again divided into *neutrophile*, *eosinophile*, and *basophiles*. Of these three classes the neutrophiles are by far the most common, forming from 60 to 75 per cent. of all the white cells. Eosinophiles and basophiles may be so scanty as not to be found in an ordinary examination; the former are seldom present to an extent of more than 2 and the latter of more than 0·5 per cent.

The most important and plentiful of the *mononuclear* order are the *lymphocytes;* the remaining order of this class is constituted by that type of cell variously known as the endothelial, large mononuclear, or transitional cell, and also by many other names. The name *monocyte* is coming into general use for this cell, and it is to be hoped that in course of time it will replace all others. Lymphocytes are further divided by those who like doing this sort of thing into large and small, but the distinction appears to be without importance. Lymphocytes normally occur as from about 25 to 40 per cent. of the white cells; the monocytes seldom exceed 7 per cent.

Embryonic Forms.—Certain other cells of types usually confined to the bone-marrow or elsewhere in the hæmatopoietic system may also occur in the blood stream under abnormal circumstances. The most important of these are the embryonic forms of the cells ordinarily occurring in the blood. The young forms of the polymorphonuclear order of cells are known as *myelocytes* and *myeloblasts*. In these cells the nucleus has not yet acquired its adult lobed condition, but is mononuclear. Myelocytes show granules in their cytoplasm and can thus be divided into the same three classes as the polymorphonuclear cells; myeloblasts, being younger and less differentiated, have not yet acquired the cytoplasmic granulation.

The embryonic forms of the lymphocytes are known as *prolymphocytes* or *lymphoidocytes*. They have unlobed nuclei and clear cytoplasm, and are thus very difficult of differentiation from large lymphocytes or even from myelocytes. Finally, megakaryocytes normally only present in the bone-marrow, may occasionally appear in the blood stream.

Changes in Number and Proportion of White Cells.

In the interpretation of the white count by far the most important points for consideration are the total number of white cells, their relative proportions, and the presence or absence of embryonic forms. It is impossible to dissociate the consideration of these three factors from each other.

Roughly speaking, it may be said that the lymphocytes are much less liable to numerical fluctuations than the polymorphs. As the factors governing variation in the monocytes are little understood, it therefore follows that in the consideration of the differential count the relative proportions of the polymorph and mononuclear orders of cells is of prime importance.

Leucopenia.—A decrease in the total white count (*leucopenia*) is always associated with a decrease of the polymorphs. The mononuclear cells usually remain at about their normal level, but on account of the decrease of polymorphs are relatively increased. Such a diminution of the polymorphs with relative increase of the lymphocytes is characteristic of conditions in which the activity of the bone-marrow is depressed and may reach a high degree in aplastic anæmia; it is a characteristic feature of Banti's disease and may be present to some degree also in primary anæmia. The leucopenia of typhoid fever is an early and constant diagnostic sign; it may be present also in measles, influenza, and tuberculosis, but less constantly, and therefore of correspondingly less diagnostic value.

Leucocytosis.—An increase in the total number of white cells usually depends upon an increase in the polymorphs, but there are exceptions to this rule. Where the white cells are increased over 10,000 per c.mm., and where the polymorphs make up over 80 per cent. of the total, the condition may properly be spoken of as a leucocytosis. When, however, the lymphocytes are increased so as to make up 40 per cent. or more of the white cells, the state of affairs is usually referred to as a lymphocytosis.

Leucocytosis is characteristic of infections due to the "pyogenic cocci," and to all infections associated with the production of pus, except renal tuberculosis. Within certain limits the degree of leucocytosis is proportional to the severity of the infection and to

* Part I. on the Red Cells appeared last week.

the capacity for response on the part of the patient; thus, in pneumonia, a high degree of leucocytosis is a hopeful prognostic sign. A white count of 40,000 per c.mm. indicates a very vigorous response; figures above this up to even 100,000 per c.mm. or over are met with from time to time but are rare.

A leucocytosis, together with pyrexia, practically always indicates the presence of a "septic" condition. The one important exception is lymphadenoma or Hodgkin's disease; the ætiology of this condition is unknown, and it is possible that actually it is an infective condition; in any case it is not infrequently associated with a considerable leucocytosis and a high but irregular temperature. In the absence of physical signs pointing to some such infective condition as pneumonia or meningitis, the presence of a leucocytosis serves as an indication for a thorough and unremitting search for some area of local inflammation or pus formation. The presence of a leucocytosis with some degree of pyrexia may serve to point to the presence of active septic inflammation in cases not doing well after operation. A rising leucocyte count, with marked increase in the percentage of polymorphs, should rouse suspicion of the presence of pus.

Although a leucocytosis is usually indicative of the activity of an infection, it is important to remember that it may occur in certain toxic states and also as the result of the action of some poisons. Of the former, cirrhosis and acute yellow atrophy of the liver are the commonest examples; of the latter, carbon monoxide and the salicylates, colchicine and quinine in large doses are those most likely to be met with in practice. Certain substances, such as nucleic acid and cinnamate of sodium are, of course, injected parenterally for the purpose of producing a leucocytosis; in the presence of an acute infection they are not usually successful in so doing, nor is there any reliable evidence that such leucocytosis as may be produced in this way has any therapeutic value.

Hæmorrhage may produce a moderate degree of leucocytosis; after a single hæmorrhage this disappears in three or four days, but if the hæmorrhages persist the leucocytosis will persist likewise.

Lymphocytosis, as explained above, may be absolute or relative. Absolute lymphocytosis—that is, an actual increase in the total number of lymphocytes—is rare, except in the case of lymphatic leukæmia, which will be referred to later. It occurs in whooping-cough and in small-pox, but the best example is afforded by that rare condition, glandular fever or acute infective mononucleosis. In this condition the white count may rise to 30,000 or 40,000 cells per c.mm., of which 80 to 90 per cent. may be lymphocytes; in the face of such a blood-picture the differential diagnosis from lymphatic leukæmia may be difficult; a valuable diagnostic point is that this latter condition is always associated with a high degree of anæmia, while in glandular fever anæmia is usually absent or only slight. Relative lymphocytosis is always associated with a leucopenia and has already been referred to.

Variations in the percentages of the classes of white cells normally found in the blood other than the neutrophile polymorphs and lymphocytes may sometimes give assistance in confirming a diagnosis, but their importance is usually not great.

Eosinophilia, or an increase in the percentage of the eosinophile polymorphs, is associated with many protozoal infestations. Perhaps the commonest of these is echinococcal or hydatid infection. The presence of an eosinophilia may assist in confirming a diagnosis of this condition, but its absence must never be taken as negativing it; the same applies to trichiniasis, filariasis, and to the presence of intestinal worms. The increase of the eosinophiles in true spasmodic asthma may sometimes help to confirm the diagnosis where the history is poorly given and no attack has been observed. Eosinophilia is the rule in pemphigus and dermatitis herpetiformis, but does not usually greatly assist the diagnosis. An eosinophilia, together with a neutrophile leucocytosis, occurs in a good many cases of lymphadenoma, but this condition has no constant blood-picture and can only be certainly diagnosed by the examination of an excised gland.

Basophilia, or an increase of the basophile polymorphs, is rare and has no diagnostic significance.

The *monocytes* are said to be increased in chronic malaria. Inasmuch as one pathologist's monocyte or transitional cell may be another's large lymphocyte little importance should be attached to variations in the percentage of these cells.

Megakaryocytes properly belong in the bone-marrow and only appear in the blood when it is subjected to great stress of activity. They may figure in the blood-films in primary anæmia and in cases of pneumonia with a high degree of leucocytosis. Their appearance has no diagnostic or prognostic significance. Under similar circumstances of red marrow activity, and particularly in children, occasional embryonic forms of the white cells may also appear in the blood stream. Their presence in large numbers, however, is indicative of an entirely unrestrained and abnormal activity on the part of the hæmatopoietic system, and on it depends the diagnosis of leukæmia.

The Leukæmias.—There are two types of leukæmia dependent upon the involvement of those portions of the hæmatopoietic system concerned respectively with the formation of cells of the polymorphonuclear and of the lymphocytic order. In the former cases the condition is spoken of as myeloid, myelogenous, or medullary; in the latter as lymphatic leukæmia. Mixed types have been described, but it is highly improbable that they ever occur; a lymphoidocytic leukæmia is also sometimes described, but it is probable that all such cases are examples either of a lymphatic or of a myeloid leukæmia, in which the majority of the cells are myeloblasts.

In the vast majority of cases of leukæmia one or other of the classes of white cells will be found to be enormously increased, the percentage of the other class being relatively diminished, but the numbers remaining actually normal. Thus the total white cell count in a case of myeloid leukæmia may be 100,000, of which the polymorphonuclears, myelocytes, and myeloblasts may make up 98 per cent., leaving only 2 per cent. of lymphocytes. In spite of this great relative diminution the actual number of the lymphocytes remains normal at about 2000 per c.mm.

In describing the blood-picture in a case of myeloid leukæmia the pathologist will usually specify the percentages of the different types of normal and embryonic cells present. In some cases, where the majority of the embryonic cells are of the myeloblastic type, the pathologist may be in doubt as to whether he is dealing with myeloblasts or prolymphocytes. The cytoplasm of the former cells contains granules demonstrable by special peroxidase stains, and to be sure with which type he is dealing, the pathologist may feel obliged to apply one of these stains. The presence of oxidase granules in the cytoplasm definitely classes the cells as myeloblasts and places the leukæmia in the myeloid category. Failure to apply this technique probably accounts for some of the anomalous cases showing the apparent blood-picture of lymphatic with the clinical signs of myeloid leukæmia.

It is important to bear in mind that a mere increase in the number of the white cells does not entail a diagnosis of leukæmia. As pointed out above, in a simple leucocytosis the cells may occasionally attain 100,000 per c.mm., and cases of 200,000 per c.mm. have been reported. Nor does the presence of an occasional embryonic form justify this diagnosis. To establish the diagnosis, embryonic cells must be present in considerable numbers; this is almost more important than the presence of a high total count, for cases of leukæmia with only a moderate increase of the white cells have been recorded.

There is a tendency to think that the more embryonic the type of cell present the more virulent

and deadly must be the leukæmic condition. On the assumption that large lymphocytes are younger than small ones, some hæmatologists regard the occurrence of cells of large size in lymphatic leukæmia and the preponderance of myeloblasts in myeloid leukæmia as indicating the likelihood of any early fatal termination. Clinical findings do not appear to support this view.

Special Articles.

MEDICINE AND THE LAW.

Cross-examination under Anæsthetic.

Lord Lee's Royal Commission would be startled by the procedure at a police investigation in Hawaii last September, when a suspected person, who had steadfastly protested his innocence, was injected with hyoscine by a police surgeon in the endeavour to elicit information from him while under the influence of the drug. The case was one of murder. An American school-boy was abducted from his school on some pretext by a man somewhat vaguely described as an "oriental." According to reports in the local newspapers which have just reached this country, the boy's father received a letter demanding a ransom of 10,000 dollars for his son; he attended at the appointed place and paid the money. The police, although they had apparently been notified, failed to appear at the meeting; later the body of the murdered boy was found in some bushes. Suspicion fell on a 20-year-old Japanese who had been chauffeur in the boy's family. The chauffeur, whose name was Kaisan, was arrested and was examined by what in England would probably be labelled "third degree" methods. He steadily maintained his innocence and his ignorance of the murder even though he was pressed with questions by expert examiners, one of whom, according to the newspaper report, "has obtained more confessions from criminals than any other man in Honolulu." Among the test imposed upon him was a direction to copy the original letter in which the ransom was demanded. As the English law-courts well know, the conclusions of a handwriting expert are occasionally fallacious. Two experts, however, were apparently satisfied that Kaisan's handwriting was identical with that of the original letter. Of the two experts—one a bank clerk, the other Dr. Stanley D. Porteus, professor of psychology in the University of Hawaii—the latter seems subsequently to have changed his mind; thus at this stage little had been done to connect Kaisan with the crime, and, in the words of the newspaper report, "Kaisan, after being quizzed constantly for 12 hours, was returned to a cell and again questioned there by Deputy City Attorney Brooks without result." In this dilemma, we are told, the police surgeon administered "a heavy injection of hyoscine hydrobromide" to Kaisan. "The drug produces a twilight sleep from which persons emerge to talk from their subconscious mind and to reveal truths that they had secreted during full consciousness. Under the effects of this drug Kaisan confessed to the writing of the ransom letter, describing in detail the process." But when the effect of the drug wore off, Kaisan repudiated any confession and steadily asserted his innocence. A few hours later a second injection was administered with entirely negative results. At this stage the real murderer was discovered elsewhere, confessed to the crime, and was dealt with; it thus became unnecessary to exhaust the resources of medicine in the attempt to extract a confession from Kaisan.

Six years ago Dr. E. House, of Ferris, Texas, read a paper [1] before the State Medical Association of Texas on the Use of Scopolamine in Criminology. Experience obtained in obstetrical practice might, he suggested, be turned to account in the detection of crime. He was even able to describe two tests made upon alleged criminals. In both cases, he said, his subjects, while under the influence of the drug, gave answers which, when corroborated, proved their innocence. The drug, by depressing the power of reasoning or imagination, elicited nothing but truthful answers. Why, asked Dr. House, should this method not be available in criminology? The bloodhound's trail may lead to the suspect's door, but corroborative evidence is indispensable before conviction; similarly, all data secured by the use of scopolamine would equally require corroboration.

In this country the answer would be that we have evolved a procedure under which statements made by accused persons to the police are not normally admissible in evidence unless the accused person has first been cautioned in a formula of words adopted on the advice of experienced judges. We cannot therefore accept a method which would negative that caution and which would trick a suspect and catch him off his guard. It would be instinctively repulsive alike to judge, counsel, and jury, apart even from the fact that English courts of law are conservatively distrustful of scientific discovery in its application to criminal investigation. To dope a man into confession would be as distasteful as to extract evidence by torture.

Successful Defence of Post-epileptic Automatism.

In a murder trial at Lancaster Assizes on Oct. 30th evidence was given by mental specialists which suggested that the accused had killed his wife while in a condition of post-epileptic automatism. The evidence indicated that the man armed himself with a revolver and cartridges and sought out his wife, who was living apart from him. He fired three shots at her and as she was being taken helpless into a neighbour's house he fired a fourth shot into her back at point blank range. He was then disarmed by the driver and conductor of a passing motor-omnibus, to whom he remarked "I have done it this time." He was asked to go to the police station, but declined, and said he would wait for the police. Later he said to a constable: "There is nothing to be afraid of; I have done it, and am ready to take my punishment: the only thing I am sorry about is my little daughter." The evidence of witnesses was that his manner was calm and deliberate and that he appeared to know perfectly well what he was doing. The accused in the witness-box gave various details of his history. As a young man he had been struck on the left ear with the prong of a hay-fork while haymaking. He had wandered away from home from time to time and had not known where he had been. He joined the army in 1897, had Mediterranean fever at Gibraltar, and malaria and sunstroke in India. He rejoined in the Great War, was blown up by a shell, suffered from shell-shock, and was eventually discharged. Major O. D. Jarvis, R.A.M.C., gave evidence of the finding of a medical board in 1922 that the accused was suffering from petit mal; there was, he said, a condition of post-epileptic automatism in which a man might do things about which he seemed quite able to reason, though entirely unconscious of what he had done. Asked by Mr. Justice Humphreys if he knew of an instance of automatism occurring after an attack of minor, as distinguished from major, epilepsy, Major Jarvis replied that he could not recall an actual case at the moment, but that from his reading he was satisfied that automatism might occur even after minor epilepsy. In answer to a further question from the judge, the witness said the accused might make statements to the police in a state of automatism, though, if he afterwards made a statement referring to acts done in the automatic state, the fact would be against the theory of automatism. Dr. Alastair Robertson Grant, deputy medical superintendent at the Whittingham Mental Hospital, who had interviewed the accused and had seen his army medical history sheets, said that automatism was frequently associated with petit mal. Dr. Arthur Lowndes, of Longton, also gave evidence. The jury found that the accused was "guilty of the act charged but insane at the

[1] See THE LANCET, 1922, ii., 1082, 1190.

time." The case is interesting in that the learned judge, who has had special experience of the administration of the criminal law, put the defence of post-epileptic automatism to the jury in more sympathetic terms than are sometimes used in our courts.

New Dangerous Drugs Regulations.

The Home Office announces its intention to make fresh regulations under the Dangerous Drugs Act for the purpose of consolidating into one code the seven different sets of outstanding regulations, a proposal of great convenience which all will approve. It is also proposed to apply the existing provisions to certain drugs and preparations recently brought within Part III. of the Act of 1920—namely, extract and tincture of Indian hemp, dihydro-oxycodeinone, dihydrocodeinone, and preparations containing them, and preparations containing less than one-tenth per cent. of diacetylmorphine. An announcement regarding these was noted lately when the 1925 Act was brought into force. It is further proposed that the new regulations shall provide for constituting a tribunal to which cases may be referred when there is reason to think that a dentist may be contravening the Dangerous Drugs Regulations. The constitution of such a tribunal for medical practitioners was one of the recommendations of the Departmental Committee on Morphine and Heroin Addiction. It was a valued concession of self-government to the medical profession and a wise recognition of the existence of adequate alternatives to proceedings in the police-court; its extension to the profession of dentistry will be an indication that the system has been found satisfactory.

INTERNATIONAL CONFERENCE ON HEAT AND LIGHT IN MEDICINE, SURGERY, AND PUBLIC HEALTH.

THE congress was addressed on the second [1] day of the proceedings by Dr. C. B. Heald, who read a paper on the development of new electrotherapeutic apparatus. Dr. Heald spoke of apparatus now in use at the Royal Free Hospital, among other appliances mentioned being a new rhythmic myotrope and a tunnel for infra-red light baths. Dr. F. Nagelschmidt spoke on foam-treatment, a new method of applying external heat. By adding a small quantity of non-toxic non-absorbable saponin solution to water of any desired temperature and blowing a current of air through the mixture a fine foam is produced. The foam contains little moisture and is very stable. The patient is laid in a bath containing a few inches of water of the desired temperature. Saponin solution is added, air blown through, and the patient is covered with the foam. Local treatments also can be given. Dr. Nagelschmidt described another application of foam treatment; oxygen is blown through the solution and a fine foam is produced which is less stable than air-foam. It has remarkable cleansing properties when brought into contact with mucous membranes and is very suitable for vaginal and urethral irrigations, intranasal treatment, and so forth. Saponin, although not itself absorbed, is said to facilitate the absorption of other substances, and is a suitable medium for dissolving drugs for local medications.

Dr. C. Conyers Morrell contributed a paper on plant pigments in relation to photosensitisation, embodying much of his original work in this field. The importance of sensitisation by plant pigments, its common occurrence, and the part played by it in animal metabolism is now recognised, and Dr. Morrell's paper will encourage further work in this direction.

On the third day of the conference Dr. F. Talbot read a paper on actinotherapy and dental caries. Dr. Talbot considers vitamin D to play a part in the arrest as well as in the prevention of dental caries. The part it plays in the development of healthy teeth is already established. Comparing the teeth of the children in a home, one year after the installation of a carbon-arc lamp, with their teeth in the three years previous to irradiation, he observed distinct improvement; there was less caries, arrest of caries in some cases, and healthier gums. He considers that general treatment, not local irradiation, is of value, and that probably irradiation is of greater value than cod-liver oil in these cases.

Dr. A. J. Cemach, of Vienna, spoke on ultra-violet therapy in oto-rhino-laryngology. Dr. Cemach treats lupus of the larynx by direct irradiation with the quartz mercury-vapour lamp. He introduces a small water-cooled burner into the mouth and guides it with the finger past the epiglottis. Constitutional treatment, tuberculin, and general light treatment in suitable cases are given concurrently. In early cases a cure may be expected, in more advanced ones sometimes a cure and always relief of pain. Extensive lung involvement is not considered by him to be a contra-indication to this method of treatment.

Sir Henry Gauvain showed cinematograph films of life at Alton and Hayling, which illustrated the part played by heliotherapy in the treatment of surgical tuberculosis. Films illustrating artificial light treatment were also shown. Sir Henry Gauvain stressed the fact that light treatment is only one of the factors in the treatment of surgical tuberculosis and should never be regarded as the only factor.

Dr. M. Weinbren spoke on ultra-violet radiation in the treatment of chronic pulmonary tuberculosis. He agreed with Rollier that cachexia and toxæmia are the main contra-indications to radiation in phthisis, and to the treatment of any other condition by light. He did not find it necessary to adhere to Rollier's method of exposure, but gave full baths with suberythema doses from the start. He found that in some cases, even among out-patients, there was evidence of improvement as shown by weight, X ray appearance, and general condition, and deduced that light treatment given cautiously to selected cases could prove of value even when it was given under the worst possible conditions for success—to hospital out-patients.

On the last day of the conference Dr. Albert Eidinow read a paper on photosensitisation. Sensitisation with eosine previous to light treatment gave deeper reactions and increased desquamation. Intravenous injections had now been abandoned in favour of local injections (into the lesion) in the treatment of lupus. Painting the skin with eosin was useless and merely cut off the light before it penetrated to the living cells.

Mr. T. C. Angus read a paper on the efficiency of ultra-violet light apparatus, with regard to the emission of light of given wave-length and current consumption. Dr. L. Hill, who presided, referred to the importance of the phenomenon of photosensitisation, which permitted the longer and more deeply penetrating rays of the spectrum to be used. He could not accept statements which had recently been made that rays of short wave-lengths penetrated much deeper into the skin than had previously been estimated. A paper by an American investigator, Dr. M. J. Dorcas, of Cleveland, U.S.A., on energy distribution of various types of arc lamps was read in the author's absence, and his slides showing energy curves were demonstrated.

The Lessons of the Congress.

It was apparent from the contributions to the congress that the principles on which actinotherapy is based are beginning to emerge as an exact science, but that its application and limitations in treatment are far from being yet clearly defined. There can no longer be any doubt that actinotherapy will occupy a definite and probably an important place in therapeutics, but there is much need of further critical investigation. Even on such fundamental questions as the extent of the range of physiologically

[1] A report of the proceedings on the first day appeared in the annotation columns last week (p. 934).

active rays there is little information and no agreement. The advantages of whole-body over localised irradiation, apart from cases in which irradiation is used to produce intense inflammatory reactions, must depend to some extent on the size of the area irradiated and on the amount of skin which must normally be irradiated to obtain a minimum or optimum general effect. On this point also we have only very scanty information. There is still no accepted unit of dosage. While the physiological action of the various regions of the spectrum is still so little known it would be unwise to attempt to express dosage by a physical formula, and with the apparatus at present in use it would be impracticable to attempt treatment using a narrow portion of the spectrum only. But it is clear that until the dosage is defined no fair comparison of results obtained by different observers can be made.

The Exhibition.

At the Medical Exhibition held in connexion with the conference, the leading firms manufacturing ultra-violet light apparatus were represented. Comparing this year's with last year's exhibits, it was noteworthy that the prices of apparatus were on the whole considerably lower, and also that the smaller and less luxurious types of stand were favoured. There were not many new models, but some of the burners have been improved, and elimination of the heating coil in the atmospheric type of burner (K.B.B.) is an improvement. A stand with improved vertical and horizontal movement is exhibited by the Medical Supply Association. High-frequency electrodes (Gallois), exhibited by Messrs. Kelvin, Bottomley and Baird, are said to combine ultra-violet radiation, capable of producing erythema with high-frequency treatment. Vita-glass Manufacturing Board exhibited samples of Vita-glass showing improved glazing and greater transparency.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.

THE BUCKSTON BROWNE TRUST.

THE dinner at the Royal College of Surgeons on Nov. 1st was the first of a series of feasts made possible by the generosity of Mr. G. Buckston Browne, F.R.C.S., who gave a sum of £5000, the interest from which should afford an annual opportunity for social intercourse between Fellows and Members of the College. By the terms of the trust at least half of the invited guests must be Members of the College, and in the following account Members are indicated by an asterisk (*).

The guests were received in the Hall of the College by the President, Sir Berkeley Moynihan, and the Vice-Presidents, Prof. Hey Groves and Mr. Warren Low, and dinner was served in the Library, the quality of the menu being indicated by the fact that Messrs. Ring and Brymer were the providers. On the right of the President sat Lord Dawson of Penn,* Sir George Newman, Sir Anthony Bowlby, Major Leonard Darwin (sole surviving son of Charles Darwin), Sir William Bragg (Director of the Royal Institution), Sir Richard Luce, M.P., Mr. C. H. Fagge (*c*), Dr. E. Collingwood Andrews,* Mr. R. P. Rowlands (*c*), Dr. Graham Little,* M.P., Sir Edward Pollock (the next-to-Senior Fellow), Mr. W. Sampson Handley (*c*), and Dr. Astley V. Clarke* (Leicester). On the left of the President sat Sir Thomas Barlow,* Sir Alfred Hopkinson, K.C., Sir Thomas Holland (Rector of the Imperial College of Science), Sir John Rose Bradford,* P.R.C.P., Lieut.-Colonel F. E. Fremantle, M.P., Sir Alfred Rice-Oxley,* Mr. F. J. Steward (*c*), Dr. Charles Edwards* (Andover), Lieut.-Colonel C. T. Samman,* Sir William Lister, Dr. A. Owen Lankester,* and Dr. Arthur H. Bostock* (Chichester). In addition to these there were also present other Members (*c*) of the Council of he College as follow: Sir Holburt Waring, Sir Cuthbert Wallace, Mr. J. Herbert Fisher, Prof. G. E. Gask, Mr. W. McAdam Eccles, Sir Charles Gordon-Watson, Mr. Victor Bonney, Mr. Hugh Lett, Mr. Leonard P. Gamgee, and Mr. R. G. Hogarth, and the following Fellows and Members: Sir Arthur Keith (Conservator), Mr. G. Buckston Browne, Mr. C. A. Griffiths (Cardiff), Mr. J. A. Hayward, Mr. H. W. Armstead, Sir John H. Parsons, Mr. J. F. Dobson (Leeds), Mr. W. H. B. Brook (Lincoln), Mr. T. H. Openshaw, Mr. Thomas H. Bickerton (Liverpool), Mr. Henry Colgate (Eastbourne), Mr. Raymond Johnson, Sir George Thane, Mr. Macleod Yearsley, Mr. J. F. Jennings, Mr. E. F. White (Crowborough), Dr. T. Wilson Parry,* Dr. H. Bellamy Gardner,* Dr. G. de Bec Turtle,* Dr. E. Le F. Payne* (Kew), Dr. Guy Wood* (Charterhouse), Dr. Rickard W. Lloyd,* Dr. E. M. Callender,* Dr. Frank Savery,* Dr. L. Haden Guest,* Dr. Ernest Ware,* Dr. Maurice Newfield,* Dr. P. Sidney Spokes,* Dr. George Parker* (Bristol), Dr. E. G. Moon* (Broadstairs), Dr. H. B. Brackenbury* (Chairman of Council, B.M.A.), Dr. Alan Randle,* Dr. T. W. Shore,* Prof. H. E. Roaf,* Prof. C. Lovatt Evans,* Dr. G. A. Buckmaster* (Bristol), Dr. C. W. Hutt,* Dr. P. H. Manson-Bahr,* Dr. W. H. W. Attlee* (Eton), Dr. J. O. Symes* (Clifton), Dr. Walter Broadbent* (Brighton), Dr. Harold H. B. MacLeod* (Shrewsbury), Dr. J. E. Kilvert* (Derby), Dr. G. Francis Smith* (Watford), Dr. Hugh Lawson* (Chislehurst), Dr. C. G. B. Kempe* (Salisbury), Dr. W. B. Maurice* (Marlborough), Dr. John Gay,* Dr. E. C. Morland,* Mr. D. J. G. Watkins* (Lincoln), Dr. Philip G. Laver* (Colchester), and Mr. W. H. Dolamore,* along with Dr. G. B. Hillman (Wakefield), Mr. Philip H. Coxe, Mr. H. M. Hake (Director of the National Portrait Gallery), Mr. O. J. R. Howarth (Secretary of the British Association), Mr. S. Forrest Cowell (Secretary, R.C.S.), Mr. R. H. Burne (Physiological Curator), and Mr. D. K. Cassels (Assistant Secretary).

Sir Berkeley Moynihan proposed the toasts of The King and The Donor, remarking that there would then and in the future be no other toasts than these on the annual occasion, and, of course, no reply to them. He alluded to Mr. Buckston Browne's gift of Downe House to the British Association and said that some of the Darwin treasures were on view in the Conservator's room. He then bade the guests mingle, an Anglo-Saxon word which with its implications of frequency and intimacy aptly described the pleasant social intercourse which followed.

RECENT WORK ON HOOKWORM.

SOME SIGNIFICANT RESULTS.

WE lately commented in a leading article [1] upon an investigation by Clayton Lane into the diagnosis of hookworm infection. Twelve years ago he took up the position that there were so many infected persons—he estimated them at about 800 millions—that they could not receive individual diagnosis before treatment unless two conditions were fulfilled. The first of these was that diagnostic methods must be far advanced from the position they then held, and the interval has seen the evolution of his diagnostic technique of direct centrifugal floatation (D.C.F.), which is simple, cheap, and certain if a single female hookworm is normally ovipositing, and which is capable of mass usage at the rate of a quarter of a million specimens yearly for every two microscopists employed. Second, the procedure employed in hookworm campaigns of taking the laboratory to the stool must be replaced by the material-to-laboratory method used in every other branch of clinical pathology. This second requirement has been rendered possible for D.C.F. by two simple expedients; the stool must be kept under water and its temperature must not exceed 80° to 86° F., except for relatively short periods, whose extent and duration he did not

[1] THE LANCET, July 21st, p. 128.

determine. These conditions being observed equally good diagnostic results can be got with a stool weeks old as with a fresh one. A fundamental point needs emphasis. Clayton Lane's final conclusions are based on egg counts made, not by the method which he used uncontrolled in 1917 when he initiated egg counts as an essential part of a hookworm investigation, nor by the equally uncontrolled method of N. R. Stoll, for both these have emerged unsatisfactorily from controlled counts. He has used a modification of D.C.F. which careful controls of wide range have shown to be more accurate than any other at present available, and which other conditions have suggested as being near to accuracy.

The first large-scale hookworm campaign, using the stools-to-laboratory method, was Clayton Lane's in 1915–17. He used for the examination of over 33,000 persons about Darjeeling the crude diagnostic methods then available. A second instance of this procedure has now been reported by A. C. Chandler, using D.C.F. and sampling, by means of about 10,000 examinations, various areas over nearly the whole of India, with its population of more than 300 millions. All the examinations were made in the laboratory of the School of Tropical Medicine, Calcutta, to which samples were posted. In one detail Chandler altered the advised procedure. Instead of being submerged the fæcal specimens were packed to the brim in tins and, because he noticed in his examinations normal-looking eggs only, Chandler concluded without using controls that there was no loss of eggs between collection and examination; he attributed this lack of development to the exclusion of oxygen. P. A. Maplestone, however, using the same tins in the same laboratory, has reported that a flange prevents complete descent of the lid, so that an air space about 2 mm. deep overlies the fæces in a filled tin, and his controlled counts show that in the first six days the number of the eggs in these filled tins is halved, those remaining being commonly embryonated, and free larvæ being occasionally seen. He found, too, that this development occurred in the superficial layers, and whether or not the fæcal surface was deprived of contact with air. These counts, as he notes, were subject to the ever-present error inherent in Stoll's method. During postal transmission of such fæces gases of decomposition are apt to force off the lid with oozing of fæces, and, as Maplestone shows, escape of larvæ which must be expected sometimes to reach infectivity—a dirty, dangerous state of affairs which postal authorities are sure to forbid. Clayton Lane's original investigation had, however, shown that submersion in thymolised water appeared to meet this difficulty, so that it is likely to be used in other campaigns unless some better means of preventing gaseous fermentation is discovered.

Chandler's stool-to-laboratory survey constitutes a notable achievement and an impressive demonstration of the practical possibility of this procedure. His work draws attention to another point, already established but persistently disregarded. By D. C. F. he obtained an infection-rate twice as great as did J. W. Tomb using Clayton Lane's earlier technique of levitation, the conditions being apparently the same; while in a Darjeeling tea garden in which district Lane's microscopists had obtained with a centrifuged smear an infection-rate varying from about 40 to 80 per cent. according to the garden concerned, D.C.F. showed one of 90 per cent. in spite of repeated intervening treatments. Statements in original papers, or even in abstracts issued under impressive authority, which do not define the technique employed in estimating a local infection, are inexactitudes parading deceitfully in a cloak of pseudo-scientific accuracy. They teem in the literature.

The Distribution of Species.

The interesting and important question of species distribution has received recent notice. Apart from Calcutta *Ancylostoma braziliense*, for which *A. ceylanicum* is a synonym, has apparently been found in man in India and Burmah when looked for. Its range, in animals at least, is world wide. *A. duodenale* appears to form a pure infection in Egypt, and F. L. Soper has reported a nearly similar condition in a Paraguay village. About the Darjeeling hills *Necator americanus* infection seems to be even purer than it is in most parts of America. Should the ethnological explanation of these differences not bear closer examination they form a pointer to some biological factor perhaps capable of preventive use by man.

The Rôle of Animals.

The influence on human hookworm infection of animals dependent on man is varied. The pig, as R. M. Gordon notes, furnished Maplestone with three specimens of *A. duodenale* and one worm which Gordon identified as *N. americanus*, but which exactly resembled specimens which Gordon obtained from pigs in Brazil. On morphological and biological grounds J. E. Ackert and Florence Payne in Trinidad separated the pig necator specifically as *N. suillus*. The morphological differences between this and *N. americanus* are of a minuteness equal to that which, according to the same observers, separates *N. americanus* as described by themselves from *N. americanus* as described by A. Looss. They should not be held specific in one case and not in the other. The biological tests were made with larvæ from untrapped cultures, and, as Clayton Lane has noted, these residual larvæ are perhaps those with least penetrative power, not average specimens, and that they did not produce infection may be explicable on those grounds. Of pigs examined in Trinidad 90 per cent. were infected with necator, and the pig must accordingly be held suspect as a "reservoir host" of this parasite and a disseminator of infection to man.

By eating and re-passing human fæces animals act as broadcasters of hookworm eggs. Chandler has obtained hookworm eggs from pig's fæces for three days after feeding the animal on egg-containing fæces. Cultures of the stool which first contained eggs after feeding produced many more larvæ than did cultures of the original stool; but again the cultures were untrapped, so that only the residual larvæ were counted. The lesson may be the opposite of that suggested. He finds that both dog and rat fill the same rôle. The influence of cattle lacks exact investigation, as does that of scarabæid beetles. Using cockroaches, he mentions an experiment in which 2 mg. of droppings from an insect fed on large numbers of hookworm eggs produced 110 larvæ, again, of course, from an untrapped culture, so that from the local numbers of these pests they must be active agents in producing a widespread soil infection in the Asansol Mines, Bengal. A good deal of incidental evidence is now accumulating as to animals forming unsuspecting baits for infective larvæ. After penetrating them larvæ shortly die and man is correspondingly safeguarded.

Light Infection.

Since Francis Bacon's time biology has rested on observation more or less controlled. For that proved procedure there is a tendency, particularly among non-medical writers on hookworm infection, to substitute a mathematical basis. An infection with a given number of hookworms is injurious, one with less is immaterial to the patient. C. W. Stiles has dealt with this "very definite, unambiguous, clinical advice based on definite unambiguous exact mathematical units," and he has emphasised, what after all every general practitioner could tell the hookworm worker, that men refuse in their reaction to disease to conform to mathematical formulæ, however impressive; so that, even if the lightest infections prove immaterial, there can be no exact mathematical group-limit between the material and immaterial ones. As for individuals, Clayton Lane has noted that tests employed must be both apt and exact. It leads nowhere to select a set of tests and, finding that they detect no difference between infected of a certain grade and non-infected, to state definitely that infections of that grade are immaterial. "It is as useless to attempt to measure entamœbæ with a foot rule,

whether obtained from Mr. Woolworth or from the Greenwich Observatory, as to record the hours of sunshine with the most delicate of barographs." [2] A set of tests established by Stiles 13 years ago did show a difference between the same community before and after treatment. They dealt with such matters as underlie material contentment—strength to earn, freedom and recovery from illness, length of life. They were confirmed by Clayton Lane in 1916 and after this interval are again being applied, but hitherto without the exact basis of accurate egg counts, made to determine the degree of infection present before disinfestation. Since these tests of energy, resistance, and recuperation have proved the most delicate hitherto employed, they or their like will doubtless be re-employed, checked by the exact diagnostic test now available, which alone can measure infections of that tenuity.

Unless the oviposition-rate of hookworms is fairly uniform, diagnosis in light infections cannot be certain. Mathematical aids have recently been called in to determine whether regular oviposition exists. H. W. Brown has pointed out that individual cyclical oviposition will produce a uniform tracing when worms are sufficiently numerous, provided, it may be commented, the cyclical condition is not due to change in environment acting equally on all worms. In the three cases he investigated the hookworms were estimated as numbering 13, 135, and 130. He laid considerable stress on figures derived from three-day and six-day running averages, that is, taking the last as an example, a comparison of the total eggs passed on days 1 to 6, with that on days 2 to 7, and so on through the whole series. But if individual, non-environmental cyclical oviposition do occur it will certainly be submerged in daily counts with 130 females laying, and it seems unreasonable not to conclude that it will be so even with 13; while with running averages of 3 to 6 days it must be wholly swamped. Here the mathematical aid invoked has proved illusory. Actually the presence or absence of cyclical oviposition can be determined only by daily counts from cases parasitised by a single female, and only D.C.F. is accurate enough to count these cases. Stoll's method used by Brown, even had it proved reliable within its limits, could not detect, much less count, an infection of this tenuity.

Migration of Larvæ.

Yet mathematics have a position in this biological problem. "Given ideal conditions of extra-corporeal development and of establishing contact with man, a single pair of hookworms is mathematically capable of destroying the human race within a year." [3] In other words, the degree of infection is of little hygienic importance, otherwise the tropics would be clear of man at this moment. It is the place and manner of defæcation, by the person with even a single pair of worms, which is significant. In our leading article already cited the proved migration of hookworm larvæ is mentioned, ease of progress determining its extent. The existence of migration has been denied on mathematical grounds, so few larvæ having been found at a distance from an infected spot. Yet mathematics show that if 10,000 larvæ reach a square inch of soil and thereupon space themselves uniformly on its surface one inch apart, they will cover a circle 4 ft. 8 in. in radius, so that the most perfect extraction will recover only one from each square inch of the soil within its circumference. If migration occur uniform recovery of such small numbers in uniform conditions would be evidence not of the restriction, but of the freedom of migration. But even if this free movement could occur all larvæ reaching the outer parts of the area would have traversed its inner portions, so that, whatever happens, the region about an infected spot must be the region of greatest risk. It follows that the more conscientious is the use of a latrine which does not prevent dejectional infection, the more generously does it infect. The importance of dejectional infection has been most strikingly proved by Cort, Grant, and Stoll in China. Of soil samples collected round latrines infective hookworm larvæ averaged about 11 per sample, while of those from ground where vegetables had been fertilised with infected night soil they averaged only about three.

[2] Brit. Med. Jour., August 4th, p. 193.
[3] Ibid.

Carbon Tetrachloride.

It requires hardihood to suggest that the popular carbon tetrachloride treatment is neither safe nor certain, but Clayton Lane has lately marshalled the deaths which have followed its use, and some evidence of its inefficacy may be discovered in important footnotes to a paper by R. W. Hill. Over 100 persons were treated first by this drug and then by oil of chenopodium, the dose of each being 3 c.cm. Apparently 25 per cent. remained infected when re-examined by H. H. Willis's uncertain method. Of the infected, Stoll's method missed 6, estimated 25 as containing fewer than 500 eggs per gramme of fæces, and in three more gave counts indicating residual infections varying between 25 and 800 worms, according as different estimates of their egg-laying power are accepted. In other words, after administration of two drugs, each in a dose which has caused a considerable number of deaths, there were, if trichostrongylus infection can be excluded, residual infections of this extent. Confirmatory evidence of the failure and risk of carbon tetrachloride lies in B. M. Wilson's statement,[4] that thymol had replaced it in Jamaica.

Carbon tetrachloride produces great fatty degeneration of the liver and sometimes of kidneys and adrenals. Administration is apparently a gamble on the occurrence of the usually rapid regeneration. It is the drug in present general use for the herd treatment of hookworm infection, that is for treatment on a mass scale without previous diagnosis, the procedure in such common use. Clayton Lane at Cardiff gave his studied reasons for the belief that with diagnosis so rapid and certain, the "persuasion" of backward races to accept herd treatment had no justification in mortality, science, or expediency, and that to use for it a drug which sometimes proved fatal in a smaller dose than that in habitual use for herd treatment was devoid alike of reason and humanity.

IRELAND.

(FROM OUR OWN CORRESPONDENT.)

Health of the Free State.

THE report of the Department of Local Government and Public Health of the Irish Free State for the year ending March 31st, 1927, was issued a few days ago. It is remarked that the census of 1926 now gives a trustworthy basis for the calculation of local death-rates, and has been of much service to public health administration. The larger town districts in the year under review show a death-rate from all causes of 15·5 per 1000 of the population. There has been a gratifying improvement since the year 1916, when the town death-rate was 19·3 per 1000. Part of this improvement is attributed to the better housing conditions of the people to-day. Typhus is being gradually eliminated, and there has been a signal reduction in enteric fever. In every county, however, advance is hampered by financial considerations. The total number of attendances of out-patients at the treatment centres for venereal disease in Dublin was 26,598; in 1922–23 it was 22,230, and in 1925–26 it was 29,315.

The Local Appointments Act.

In the Dail last week President Cosgrave moved that a select committee of 11 deputies should be appointed to inquire and report whether, having

[4] Ibid., p. 207.

regard to the experience gained in the working of the Local Authorities (Officers and Employees) Act, 1926, any amendment of that Act was desirable. It will be remembered that by the Act the power of election of officers of local authorities was taken from those bodies and the choice of persons to be appointed to each position was entrusted to a Local Appointments Commission, which normally acts on the advice of a Selection Board. Many medical men welcomed this change, because it took the appointment to medical posts out of an atmosphere of political and family influence, if not because it was a step in the direction of a State-controlled service with entrance by competitive examination. As far as medical appointments are concerned the Act has worked without any cause for complaint, and there is no doubt that a better class of candidates is now attracted to the public service. If any change is made as the result of the inquiry by President Cosgrave's committee it is to be hoped that the change will be a step farther in the direction of central control, rather than of restoring power to the local bodies.

SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The Local Government Reforms.

THE Secretary of State for Scotland and the Under Secretary have both been much occupied on the platform and with deputations for the last two months. The reception of the new local government proposals is critical and slow. The great health authorities are favourable, but the education authorities are largely antipathetic. Major Elliot made a good point in a speech reported as follows :—

> "It was said that it meant an invasion of Scottish rights and an attack on Scottish local government. It seemed to him to bear in the opposite direction. The new county authorities and town councils controlling education and poor relief and all matters of local government would have a responsibility and power which were never possessed by local authorities in Scotland before. To unify the local authorities in Scotland and produce 30-odd great bodies was to produce bodies far more capable of standing up to the departments in Edinburgh or even to the Imperial Parliament than any local authority which they had ever seen in Scotland before."

In the process of devolution of administrative work, strong local authorities are a necessary counterpoise to the insistence of a central Government bureaucracy.

A Campaign for Health.

The Combe Trust has done many good things in the last two generations, and has now made possible a useful series of "talks" at the Edinburgh Y.M.C.A. lecture hall. The first was given by Dr. Chalmers Watson on The Doctor, the Individual, and the State. Dr. Watson always speaks with moderation and knowledge, and he was right in saying that "the development of a campaign for health would bring the numerous campaigns against disease—cancer, rheumatism, tuberculosis, heart disease, &c.—into a truer and wiser perspective." For these reasons he believed that the work of the recently constituted Scottish Health League merited the keen interest and support of the community.

The second talk of the series was given by Lieut.-Colonel J. du P. Langrishe, lecturer in Public Health in the University of Edinburgh, who took as his subject the Influence of Sunlight on Health.

I learn that a plan of campaign is being prepared for the Scottish Health League, the headquarters being the Usher Institute of Public Health. The new health museum that has grown up under Prof. Lelean's unresting energy is one of the best things to be seen in any Scottish medical school. It indicates a first-class conception of health object-teaching.

Sir Auckland Geddes on Education and Physique.

As Minister of National Service during the war, Sir Auckland Geddes has more knowledge than any other man of what the country suffered from defective physique, and he drove home the lesson in his address to the Philosophical Institution the other day when he spoke of education from the three standpoints—racial, physical, and mental. He would never forget, he said, the horror which struck him when he had to face the figures of the total men of military age in the country as contrasted with the total of men of military age who were fit. The difference—and he chose his word carefully—was appalling. He knew that a great deal had been done since, and was being done, but in many towns and villages and in the scattered cottages of the countryside, the physical side remained as hopelessly inefficient to-day as it was before the war. He declared—and the facts are only too true—that he could take his audience to cottage homes where the mental condition and health knowledge of mother and father were mediæval, where they dared not send for medical men to see their children, because they were already in debt to the local practitioner, and would not add to this indebtedness.

The address as a whole was an impressive plea for better adapted schools, for a high individual education, and above all for education in health and the production of personal fitness. It is gratifying to those who have given a life-time to these causes to hear a man of Geddes's force justifying our day's work from another standpoint.

Ultra-violet Light.

The Edinburgh child welfare centres are already well provided with lamps; but now the city has made a new departure: the Portobello Baths are fitted with appropriate lamps for all that wish to use them—on terms. The important fact is that the lamps are under skilled medical direction.

The Services.

ROYAL NAVAL MEDICAL SERVICE.

Surg. Lt. (D.) L. V. Donegan to *Vivid* for R.N. Barracks, Devonport.

ROYAL NAVAL VOLUNTEER RESERVE

Proby. Surg. Sub.-Lt. H. L. Hoffman to be Surg. Sub.-Lt.

ROYAL ARMY MEDICAL CORPS.

Maj. J. T. Simson is re-empld. under Art. 507 (b), Royal Warrant for Pay and Promotion, 1926.

Lt. E. W. Hayward and Temp. Lt. J. E. Stokes resign their commns.

ARMY DENTAL CORPS.

Lt. D. W. N. Squires to be Capt.

ARMY RESERVE OF OFFICERS.

E. W. Hayward to be Lt.

TERRITORIAL ARMY.

Maj. J. K. Lund to be Lt.-Col. and to comd. the 125th (E. Lan.) Fd. Amb.

Maj. R. Coffey, having attained the age limit, retires and is granted the rank of Lt.-Col., with permission to wear the prescribed uniform.

Capt. L. A. Wilson, having attained the age limit, relinquishes his commn. and retains his rank.

TERRITORIAL ARMY RESERVE OF OFFICERS.

Capt. G. S. Phillips, from the Active List, to be Capt.

ROYAL AIR FORCE.

Flight Lt. (Hon. Squadron Leader) C. A. Meaden resigns his tempy. commn. and is permitted to retain the honorary rank of Squadron Leader.

INDIAN MEDICAL SERVICE.

Madhavrao Subrao Katre to be Temp. Lt.

Temp. Capts. relinquishing their commns.: Jatindra Mohan Dutta Gupta (and retains his rank), Jatindra Mohan Benerjee, Krishna Chandra Varma (and retains his rank).

Lt.-Cols. P. M. Rennie and S. A. Ruzzak retire.

Public Health Services.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

THE following are 1927 statistics of three cities :—

Name of district and estimated mid-year population.	Birth-rate.	Death-rates per 1000 of the population.					Death-rates per 1000 births.		
		All causes.	Tuberculosis.	Cancer.	Respiratory diseases with influenza.	Heart disease.	Infant and neonatal mortality.	Diarrhœa, &c., under 2 years.	Maternal mortality from childbirth.
Newcastle-upon-Tyne (288,500)	18·7	12·4	1·39	1·19	2·5	1·7	88/41	9·4	3·7
Salford .. .. (247,600)	17·3	13·9	1·66	1·27	3·5	1·5	81/—	15·6	3·7
Portsmouth .. (232,100)	17·1	12·7	1·00	1·53	2·1	2·2	55 24	3·5	4·5

The death-rates of pre-school (1–5 years) children per 1000 births were: Newcastle-upon-Tyne, 44; Salford, 50, Portsmouth, 42.

Newcastle-upon-Tyne.

Dr. Harold Kerr reports that the coal trade was extremely flat, but that a slight revival in shipbuilding eased unemployment to some extent. The expenditure on poor relief was £383,460 as compared with £486,374 for the previous year and £401,024 for 1925. The year 1927 was cold and grey with a miserable summer. The hours of sunshine were 899 as compared with 1085 in 1926. The atmospheric pollution gauges indicate less tarry matter in the industrial areas than in the residential areas. The "chief sinners" among the factory chimneys belonged to the corporation, but have improved somewhat, although more grit is produced from the tramway's chimney. A regional smoke abatement committee is endeavouring to find a common policy for Tyneside, but finds it difficult to get all the different authorities into line.

An effort has been made to follow up cancer cases, and now that the University has formed a branch of the British Empire Cancer Campaign this investigation promises more success. There were 116 notifications of small-pox with no deaths. Contacts, with the exception of tramps in two lodging-houses, readily accepted vaccination. Diphtheria was relatively less frequent, but the type was more severe, the case-mortality being 7·1 per cent. Encephalitis lethargica has shown a gradual decline since 1924, but of the 21 cases notified in 1927 only one recovered, while 11 died and 8 were rendered incapable of employment by mental or nervous impairment. In May immunisation of the City Hospital staff was adopted both for scarlet fever and diphtheria, and since then no further cases have occurred among them. The beds are now used for a variety of diseases. Thus the admissions included 173 cases of pneumonia, 63 of measles, 55 of erysipelas, 13 of encephalitis lethargica, and 12 of cerebro-spinal fever.

There were 362 new cases of syphilis and 525 of gonorrhœa at the V.D. clinic as compared with 290 of syphilis and 483 of gonorrhœa in 1926. The attendances per case are now 17·5, but 41 per cent. of the patients cease attending before completion of treatment. There were 58 notifications of ophthalmia neonatorum, all of whom recovered. Of 401 registered blind persons, 76 are said to have been blind from birth, but only two are under 5 years of age, and of these one was not born in Newcastle and the other had a congenital malformation of the eye. The decline in diarrhœa (the deaths in 1927 were fewer than ever before) is claimed by Dr. Kerr as a proof of a much better informed motherhood. The babies, however, suffered much from respiratory diseases during this sunless year, in spite of the relative absence of whooping-cough and measles. Dr. Kerr points out that neither the neonatal nor the maternal mortality has declined appreciably during the present century in Newcastle, but that fortunately the mortality from puerperal sepsis is low in Newcastle. The antenatal clinics were attended by 1047 mothers, while the total births were 5395. The infant mortality-rate was 119 in All Saints ward and only 38 in Heaton ward. Attendance at confinements was shared equally by medical practitioners, midwives, and the Princess Mary Maternity Hospital. Free milk is now only distributed to the very poorest; even so, 18¾ tons of dried milk were distributed free, while 21 tons were delivered at cost price. The increased attendances at the 11 welfare centres makes the provision of more medical sessions urgent. The babies' hospital and mothercraft centre is doing good work for babies suffering from wasting and other chronic conditions, and its grant from the health committee has been increased. The death-rate from tuberculosis, although very high, is lower than it has ever been before in Newcastle and is one of the lowest in the district. Tyneside apparently suffers from a particularly virulent and rapid type of the disease, and in consequence it is difficult to keep the sanatorium beds fully occupied, whereas there is a waiting-list for the "advanced" beds. Workshops for occupational therapy are being established at Barrasford Sanatorium.

Out of 376 milk samples examined for tubercle 14, or 3·7 per cent., were found to be infected. The 334 milch cows stalled within the city are examined at least four times in the year and among them six tuberculous animals were found. Some of the private slaughter-houses are in a "shockingly bad" structural state and there never was a greater need of a public abattoir than at present. Of 188 samples of milk examined for excremental pollution, 40 per cent. were found to be dirty. Between June and September the percentage of dirty milks was 73, and Dr. Kerr comments that there is plenty of room for clean milk competitions and similar efforts. He also points out that two exceedingly well-constructed automatic machines selling milk in pennyworths have been set up in poorer parts of the town and "have been the means of distributing excellent milk in first-class condition."

There is still a vast amount of overcrowding which shows no signs of lessening, although the corporation's contribution during the year to the housing shortage after allowing for "compensatory" houses was 1536. Dr. Kerr gives a cheering account of the manner in which the tenants of the three condemned areas have settled in the houses provided for them in the outskirts and are taking pride in their gardens. There was, it is true, a small residue of confirmed slummers, who had to be evicted and with whom nothing could be done, and a few of the new colonists make no attempt to furnish their houses and will probably drift back to the slums; but "there is no question that the municipal housing has had a wonderful effect in raising the domestic tone of large numbers of the submerged tenth."

Salford.

Dr. H. Osborne shows that there was an increase of 358 deaths over the number occurring in 1926, when the Salford death-rate was the lowest recorded (12·4). The following were some of the principal increases during 1927: influenza 79, pneumonia 74, tuberculosis 39, nephritis 29, violent deaths (excluding suicide) 34, and heart disease 131. Since 1920 the birth-rate has declined year by year from 27·3 to 17·3. The infant mortality-rate of 81 is the lowest ever recorded, and may be compared with the rate of 207 for the quinquennium 1893 to 1897. The work of the maternity and child welfare department is being seriously impeded in the Broughton district by the want of

adequate premises, and the desirability of setting up a combined child welfare and school centre is urged. The maternity home and babies' hospital has at present ten beds for mothers and 18 cots for babies. Many applications for confinement have to be refused, and Dr. Osborne presses for the present building to be devoted to the increased number of 15 maternity beds and for a new building to be erected for the babies' hospital on an adjoining site. All cases booked for the maternity home are invited to attend a special antenatal clinic. The mothers very much appreciate the antenatal clinics and the midwives coöperate well. The babies' hospital does good work in treating cases of marasmus and malnutrition. The artificial light installed in 1926 has proved beneficial, and it is specially noted that the simplest methods of feeding, which can easily be continued by the mothers after discharge, have proved the best for marasmic infants. Some remarkable photographs are given of marasmic infants before and after treatment and are stated to be by no means exceptional cases. The maternity and child welfare scheme includes nine welfare centres and two special treatment clinics. Massage is provided at several centres and has been found useful. Of the 4301 births, 3051 were attended by midwives, who sent for medical help in 1254 cases. The 47 babies, who suffered from ophthalmia, four of which were classed as "very bad" cases, four as "bad," and six as "fairly bad," all recovered without injury to sight. Additions made to the window displays at the health offices included an exhibit on dental hygiene loaned by the Dental Board and another dealing with the prevention of rickets. The Nab Top Sanatorium, which could not be kept full with early cases of tuberculosis, has been profitably used for an increased number of children with early and sometimes indefinite signs of the disease, and an open-air school is being erected for their education. In January, 1927, Dr. G. J. Crawford was appointed "whole-time" city bacteriologist. An improvement scheme affecting 75 houses and 337 persons has been approved for a congested area in the Greengate district. The area will not be used for dwelling-houses, and houses on another site will be provided for the displaced tenants.

Experiments have been continued with smokeless fuel. There are now over 40 "Salford" grates in the Health Department burning vertical dry coke, and similar grates in the hospitals and municipal lodging-house, and it is found that for equivalent heating the cost of these dry coke fires is only half that of coal fires. Coalite has also been found satisfactory, and it is hoped that its price will shortly be reduced. The trouble with ordinary gas coke is that it is water-logged. The experiments carried out as to the heating effects of the various fuels are fully described. Interesting comparisons of the amount of tar and soot, as an indication of domestic smoke pollution in Salford, Marple, Liverpool, and Southport are given. Although the total deposit from the atmosphere in Liverpool exceeds that in the central part of Salford, the tar and soot deposit is 20 per cent. higher in the case of Salford. Observations have also been carried out to ascertain the variations of the amount of "sunlight" available as distinguished from "bright sunshine." The method adopted was to expose an acidified solution of potassium iodide and to measure the milligrammes of iodines liberated by the light. The observations have been carried out daily for two years at four stations, namely: (1) Regent-road, in the centre of Salford; (2) Nab Top, Marple, about ten miles to the south-east; (3) Ladywell Sanatorium, in the western suburbs; and (4) Drinkwater Park Hospital, four miles to the north-west. The results were somewhat surprising. A summary of the two years results shows that Drinkwater Park was 16 per cent., Nab Top 11 per cent., and Ladywell Sanatorium 10 per cent. better than Regent-road. The tar and soot deposit at Marple is double that of Southport, and Dr. Osborne suggests that it is sufficiently near the Manchester group of towns to receive the drift of domestic fumes.

The municipal common lodging-house—"Salford House"—is evidently appreciated, as its beds were 95 per cent. occupied during the year, whilst the beds of the other common lodging-houses were only 66 per cent. occupied. There are only 115 milch cows housed in the city, but amongst these two tuberculous udders were found during the year. As regards outside milk, 371 samples were examined for tubercle and 31, or 8·3 per cent., were found to be infected. So far, it is pointed out, the new legislation has produced no improvement in the milk-supply as regards tuberculosis. The very interesting report of the public analyst shows that the Salford Corporation continues its strenuous efforts to circumvent food fakers.

Portsmouth.

Dr. A. Mearns Fraser gives particulars of the present state of the housing problem. During the five years before the war the annual average of new houses was 760. During 1914–18 the number was 160. During the last six years the number of new houses has been 274, 162, 221, 421, 682, and 898 respectively. Of the 898 built in 1927 only two were municipal, but 272 municipal houses are nearing completion. The dock-yard employees are forming a public utility society to erect 160 houses. At the present rate of building, all who are able to pay a rent of 10*s.* to 15*s.* will be provided for at no distant date. During 1896 to 1914 the corporation demolished over 500 unfit houses and removed the worst slum area. The next worst area is now being cleared and the old buildings replaced by modern two-storey tenements. Dr. Fraser goes on to deal with the remaining difficulty—namely, 500 old cottages and houses quite worn out and unfit for habitation, let at rents mostly varying from 3*s.* 6*d.* to 6*s.* 6*d.* per week. Most of these tenants want better accommodation, and a considerable proportion could pay a higher rent. Dr. Fraser describes the scheme, which was approved by the city council in December last. Sites have now been approved and an excellent lay-out and plans for 153 houses and 12 flats have been prepared. When this instalment has been completed some of the worst of the 500 can be dealt with. As accommodation for the dishoused tenants is made available the old houses will be closed and demolished under Part I. of the Housing Act, 1925. The new blocks will resemble some already built consisting of two self-contained houses and four flats, but smaller tenements will be provided for single persons and families of two only.

In allocating, families with children will be given the self-contained houses or the tenements on the ground floor. It is estimated that if the houses do not cost more than those at present being erected and the rents average 8*s.* a week the annual loss will be just over one-third of a penny rate, but if, as is probable, a proportion of the tenants cannot pay the new rents further assistance in some form or other will have to be afforded from the rates. It is not likely that the loss will thus be more than doubled and even if it is, Dr. Fraser considers the expenditure justifiable for this public health measure of first-class importance. Examples are given to indicate the deplorable conditions prevailing in these old houses.

Scarlet fever antitoxin was used for 251 cases in the hospital with satisfactory results. The need for beginning the treatment at an early stage of the disease is emphasised.

A chart brings out the fact that whereas formerly 1 out of every 6 babies died in the first year of life, now only 1 out of every 19 dies. The scheme by which pregnant women can for a fee of 5*s.* ensure payment for the services of the doctor, who may need to be called in by the midwife, has been widely used. The total net cost to the local authority for the services of doctors called in by midwives during 1927 was £508, and the cost in the year preceding the scheme was £541. Under the insurance scheme the local authority paid 48 per cent. of the doctors' fees, whereas in the previous year the local authority paid 68 per cent.

INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED OCT. 27TH, 1928.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 148 (last week, 128); scarlet fever, 3101; diphtheria, 1354; enteric fever, 64; pneumonia, 1047; puerperal fever, 31; puerperal pyrexia, 104; cerebro-spinal fever, 3; acute poliomyelitis, 13; acute polio-encephalitis, 1; encephalitis lethargica, 25; continued fever, 1; dysentery, 8; ophthalmia neonatorum, 103. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the Metropolitan Asylums Board on Oct. 30th–31st was as follows: Small-pox, under treatment 8, under observation 1; scarlet fever, 2690; diphtheria, 1858; enteric fever, 31; measles, 76; whooping-cough, 277; puerperal fever, 20 (plus 10 babies); encephalitis lethargica, 69; poliomyelitis, 3; "other diseases," 22. At St. Margaret's Hospital there were 16 babies (plus 6 mothers) with ophthalmia neonatorum.

Deaths.—In the aggregate of great towns, including London, there was no death from small-pox, 1 (1) from enteric fever, 7 (1) from measles, 10 (2) from scarlet fever, 22 (7) from whooping-cough, 29 (4) from diphtheria, 76 (26) from diarrhœa and enteritis under two years, and 76 (17) from influenza. The figures in parentheses are those for London itself.

Two fatal cases of measles were reported from Liverpool and 4 fatal cases of scarlet fever from Leeds. Nottingham reported 3 fatal cases of diphtheria. The deaths from diarrhœa and enteritis under two years are now diminishing; Liverpool reported 7, Manchester 6, and Sunderland 4. The deaths from influenza are beginning to rise.

The number of stillbirths registered during the week in the great towns was 235 (corresponding to a rate of 36 per 1000 births), including 47 in London.

Correspondence.

"Audi alteram partem."

A RADIUM-PLATINUM ALLOY.

To the Editor of THE LANCET.

SIR,—I note in your last issue (p. 932) a short description of an alleged discovery by Dr. Max Heiner, reported from a medical congress at Hamburg. The same wonderful discovery has previously appeared in a more extended form in the lay press and the same claims are made—namely, that an alloy is produced of radium and platinum. Any chemist of but slight experience will at once query the existence of such alloy, as metallic radium is a curiosity. Radium as a metal is like sodium, practically non-existent in the free state, soon oxidising in the presence of water vapour to radium hydroxide.

Let us grant for the moment that Dr. Heiner has produced an alloy of radium and platinum. The next claim is that pointed cylinders are made up and "when introduced into the body radon diffuses into the surrounding tissues and disintegrates intracellularly: so that biological effects are to be expected not only from the gamma rays, but also from the much more potent alpha and beta rays." A beginner with the slightest knowledge of the physics of radium well knows that the alpha rays can be screened by a thin piece of paper. With a dense metal like platinum inan alloy with radium the amount of alpha rays given off from the mere outer skin surface of this needle will therefore be almost nil. Similarly the radium emanation itself will be screened off except from the extreme outside of any metallic alloy. In the classical experiment of Rutherford and Royds to determine the chemical nature of alpha rays the thickness of the glass capillary tube allowing their passage *under pressure* was 0·01 mm. The light diffusible gas, helium itself, did not pass; only the stripped nuclear portion of the atom went through, devoid of planetary electrons, in a nascent state. With platinum, density 21·5, compared with glass, 2·6 (comparative density thus 8·3 to 1), it seems theoretically impossible for any appreciable amount whatsoever of radium emanation to be given off.

Next, as to the beta rays, these in most instances are objectionable and caustic, and indeed would be very variable in amount, being filtered from the centre and all other parts, to the periphery of the alloy needle. Twenty years ago Dominici (*Bulletin de l'Association Française pour l'Étude du Cancer*, Tome 1, No. 1, 1908 (Felix Alcan)), in his original and profoundly accurate description of radium treatment by gamma rays, realised the idea of exact filtration, and the gamma ray treatment, which is all-essential, can only be carried out by scientifically exact primary filtration with platinum *shutting off* alpha and beta rays. This would not be possible in a radium source varying in filtration thickness according to where the individual radium particles were situated in the depths of the needle.

Furthermore, with the standard method of radium therapy, protected by platinum or other appropriate and dense metals, the radium element is contained in the interior of the screen or needle and the important radio-active mineral is preserved for thousands of years, while the screen when worn may be replenished when required. In the case of a "radium alloy," in the course of a few years, from actual application and frictional wear and tear, not only would the platinum be worn down, but the granules of preciously expensive radium interspersed with the platinum would become dispersed and needlessly lost.

I should be pleased to hear the opinions of scientific workers on this question, but as at present reported, this "radium-platinum alloy" appears to me to be a definite retrograde step which is likely to act as a set-back to accurate dosage treatment with radium, which is even now little understood in our country except by specialist radium surgeons.

I am, Sir, yours faithfully,

SPENCER MORT, M.S. Glasg., F.R.S. Edin.,
(Lt.-Col.); Surgical Director, North Middlesex Hospital.

North Middlesex Hospital, Edmonton, N.,
Nov. 3rd, 1928.

THE "RANGE OF UREA-CONCENTRATION" TEST.

To the Editor of THE LANCET.

SIR,—In Dr. T. C. Hunt's article on this subject in your last issue there are a number of points with which I am hardly in agreement.

Writing of "small white" and "small red" kidneys, he says:—

> "In the first the urea range shows a parallel diminution with that of the maximum concentration, in the second a poor 'MacLean figure' is accompanied by a relatively good range—i.e., a high 'urea index.'"

Also—

> "The urea index is seen to bear a close inverse proportion to the degree of nitrogen retention: under 12 it is always associated with a blood-urea above normal, while above 25 it appears to suggest the 'small red' rather than the 'small white' kidney, and to be strong evidence against the presence of any but very slight retention."

First of all, I think most practitioners take the term "small red kidney" to mean the granular or primary contracted kidney—the so-called primary chronic interstitial nephritis (Gaskell)—and associate with it a serious condition in which nitrogen retention is marked. Although Dr. Hunt does refer to this "small red" kidney as the "benign essentially arterio-sclerotic kidney" he is apt to cause confusion in the minds of some by leading them to think that cases which they have been taught to regard as serious, especially when "MacLean's figure" is below normal, may have normal nitrogen retention and a

relatively good prognosis. The class of case to which he refers is, I think, the same as that mentioned by me in the paper on the above test under the heading of hyperpiesia (Case 4 and another)—arterio-sclerotic kidneys—a clinical group in which the brunt of the disease seems to have fallen on the vascular system, the kidney substance suffering in so far as its vessels are affected (nephro-cirrhosis arterio-sclerotica) and generally revealing little or no loss of function. As it is not possible satisfactorily to correlate the signs and symptoms of kidney disease with the underlying pathological condition it is preferable to base our diagnoses or classification on the results of function tests, and in doing this to give the fullest consideration to the state of the cardiovascular system and to other factors having a bearing on the kidneys.

In publishing the test I was careful to avoid any such formula as the "urea index," preferring to leave the "maximum" and "minimum" values as a ratio. All the modern work on œdema shows that water excretion is not only dependent on the condition of the kidneys and the circulation, but also on the state of the plasma and tissues—on the protein osmotic pressure of the plasma, &c. This is one reason, especially in subacute parenchymatous (hydræmic) nephritis why it is inadvisable to use the "urea index"; the ratio itself is all right. The value of water as a test does not run strictly parallel to that of urea concentration as a test, but in any case the figure for dilution enhances the value of that obtained for concentration. For example, in marked hydræmic nephritis a ratio of 4·2/4·0 is quite an ordinary result. The "urea index" would be 4·8. According to the above quotation from Dr. Hunt's paper this always means a blood-urea above normal. We know, however, that in such cases the blood-urea is seldom raised. Again, are we to infer that such an index of 4·8 is of worse omen than one derived from the terminal stages of chronic interstitial (azotæmic) nephritis with a ratio of 1·3/1·1 (index = 15·4)? A much truer interpretation is obtained by applying my original remarks to the ratio: "taken conjointly the lower the maximum concentration and the more restricted the range the worse the prognosis." Urinary tests of function, anyhow, have a very limited value in acute or subacute kidney conditions where œdema or hydræmia is present.

It is not correct to designate as "MacLean's figure" the maximum obtained in the range test, as in some instances where this is low one may be dealing with kidneys that are over-sensitive to urea as a diuretic and in MacLean's test may pass more than the stipulated volumes in the various hourly periods. If by repetition of the latter test the amounts are still excessive a calculation must be made to allow for such dilution. The range test avoids this trouble.

The point raised by Dr. Hunt about the collection and examination of samples over longer periods in the water-excretion part of the test was considered afresh when R. S. Allison brought up the matter at the Royal Society of Medicine in November, 1925. I do not think there is any advantage to be gained by prolonging the test for more than three hours (at the most four hours). If the urine is collected hourly for these three hours one has sufficient evidence of the diluting power of the kidneys to make a comparison with the concentrating power. Indeed, bearing in mind what has already been said about the part played by factors other than the kidneys in water excretion it is not unlikely that prolonged and elaborate investigations with the water test may, unless great care is taken, lead to wrong conclusions. The normal response to 30 oz. of water taken on an empty stomach is that polyuria occurs within one-half to three-quarters of an hour when it reaches its maximum and then sinks rapidly. The bulk of the fluid is excreted within three hours. In damaged kidneys the polyuria is delayed and the total volume is reduced. Accordingly the only alteration I wish to make in the test (*Brit. Med. Jour.*, 1925, i., 64) is the substitution of the collection of urine for three hourly-periods instead of for two hours. Indeed, one would make little or no mistake if one kept to the two-hour specimen as described, but perhaps the amendment is better. Finally, with reference to post-mortem findings that occasionally seem at variance with the results of the test one should not be too ready to condemn the latter—on the contrary, one should rely rather on ability than appearances. Besides, in "nephritis" other organs and tissues are involved and sometimes may be as much if not more at fault than the kidneys.

I am, Sir, yours faithfully,

E. G. B. CALVERT.

Harley-street, W., Nov. 6th, 1928.

DEATHS UNDER ANÆSTHESIA.

To the Editor of THE LANCET.

SIR,—The suggestion made by Dr. Clausen in his letter of Oct. 27th regarding the Trendelenburg position in spinal analgesia is a very important and valuable one in cases where the blood pressure and pulse-rate are alone affected. If in addition to low blood pressure and increased pulse-rate there is depression of the respiration and cyanosis, as in the case reported, the Trendelenburg position will not only hamper the function of the respiratory organs by the pressure of the abdominal contents against the diaphragm, but also further impede the action of the right heart by an excess of venous blood from the abdomen and lower limbs. In these circumstances, I suggest that a change to the Trendelenburg position may precipitate disaster.

I am, Sir, yours faithfully,

Aberdeen, Nov. 3rd, 1928. J. ROSS MACKENZIE.

Parliamentary Intelligence.

NOTES ON CURRENT TOPICS.

OPENING OF NEW SESSION.

THE last session of the present Parliament was opened by the King in State on Tuesday, Nov. 6th. In the course of the gracious speech from the Throne His Majesty said that the estimates for the Services in the coming year, which would be laid before the House of Commons in due course, were being prepared with strict attention to the continuing need for economy in public expenditure. The situation in the mining areas continued to engage the earnest attention of the Government who were taking energetic steps to promote the success of the scheme of industrial transference and migration. The abnormal expenditure out of the Unemployment Fund entailed by the displacement of labour from the mines would render necessary an increase of borrowing powers, and a Bill dealing with this question would be laid before Parliament. Measures would be presented to both Houses for giving effect in England, Wales, and Scotland to the comprehensive scheme which had been prepared by the Government for the reform of the rating system on a more equitable basis, for the reorganisation of local government, and for the readjustment of the financial relations between the State and the local authorities. The proposed changes in local government and in the relations between the Exchequer and the local authorities were measures of far-reaching importance. The Government anticipated that they would enable better provision to be made for the health of the people and would direct assistance particularly to those areas whose needs were most pressing.

HOUSE OF COMMONS.

TUESDAY, NOV. 6TH.

DEBATE ON THE ADDRESS.

During the debate on the motion that a humble address should be presented to His Majesty thanking him for the gracious speech from the Throne,

Lieut.-Colonel FREMANTLE said he hoped, by the help of all well-wishers of factory and workshop legislation on both sides of the House, that they might well be able to find time before the end of the present session for the passing of the now much-needed and frequently promised Factories

and Workshops Bill. The anticipation in the King's speech that the proposed changes in local government would enable better provision to be made for the health of the people was not encouraging to those who were keen on this or that particular measure of social progress. Still less was the fact that there was no mention of housing at all in the speech an encouragement. They had heard nothing that afternoon in regard to the question of the removal of the housing subsidy, yet it was vital to the housing movement to economise their resources as much as possible, and there was no question that a great deal of the subsidy on houses with a rent of over 1 guinea a week was being thrown away at the present time. The Prime Minister had stated that Parliament would have to deal with the Rent Restrictions Acts in the Expiring Laws Continuance Bill. Those Acts were at the very bottom of their difficulties in connexion with slum property and slum clearance. The development of estates was being delayed because of the exceptional instances of control. Here and there control had held up the erection of houses and had got in the way of development. It was causing inequalities to owners, unjust profiteering on the part of tenants as opposed to subtenants, and a great deal of suffering to subtenants. The Departmental Committee which dealt with this matter, and which represented the Labour Party as well as other parties in the House, recognised the inequalities of the Rent Restriction Acts and control, and recommended a good deal of decontrol. There was abundant reason why the subsidy should be further knocked off houses of the highest rental value. Decontrol and desubsidising were imperative simultaneously. By removing the subsidy on the more expensive houses, which were being adequately provided by private enterprise, much money would be set free by which they would be able to subsidise slum clearances. There was no promise in the speech that the subject of slums was to be dealt with. The Prime Minister said, in December, 1924, when he took office: "We have got to get rid of two things—the shortage in houses and the disgrace of the slums." He (Colonel Fremantle) believed that if they achieved decontrol and desubsidising they could have improvements in the slums.

The report of the Lunacy Commission, which was issued three or four years ago, revealed a system which was insufferably hard on a large number of mental cases. He sincerely hoped that time might be found for legislation on this subject. Referring to small-pox, Colonel Fremantle said that the country was suffering at the present moment from a vast outbreak of preventable disease—small-pox. It had been a mild type of that disease, but the medical profession could give no assurance that it would not become worse. They were sitting on the top of a volcano. He was glad that the great Powers had agreed, under the ægis of the Health Organisation of the League of Nations, to study the question of small-pox. A committee had been formed to study it permanently. Our own country was condemned as being one of the most infected with small-pox of all the civilised countries of the world. It was recognised that we were more behindhand in the application of vaccination than any other country, and other countries recognised the necessity for keeping up their quarantine regulations against us. Vaccination had hitherto been left in the hands of the poor-law guardians, while small-pox was in the hands of the sanitary authority. He hoped that in the reorganisation of local government it would follow, as a result of the Government's scheme, that the matter of vaccination would be under the control of the larger authorities.

Mr. BALDWIN (Prime Minister) said that he regretted that, owing to the overriding necessity of devoting the time of Parliament to the passage of the rating reform proposals of the Government, it would not be possible to deal with the Factories Bill.

SWINEY PRIZE FOR WORK ON MEDICAL JURISPRUDENCE.—The next award of this prize—a silver cup of the value of £100 and money to the same amount—to the author of the best published work on Medical Jurisprudence will take place in January, 1929. The award is made jointly by the Royal Society of Arts and the Royal College of Physicians, and any person desiring to submit a work, or to recommend any work for the consideration of the judges, should do so by letter addressed to the secretary of the Royal Society of Arts, John-street, Adelphi, London, W.C., not later than Nov. 30th.

ROYAL EDINBURGH HOSPITAL FOR INCURABLES.—The managers are considering a scheme of rearrangement of wards, which would enable additional accommodation to be found for women patients, the existing pressure being officially described as "very distressing." Last year, out of 247 applications for admission, only 128 could be accepted, and many of the applicants die before accommodation can be found for them.

Obituary.

SIR HUGH KERR ANDERSON, M.D. CAMB., F.R.C.P. LOND., F.R.S.

Sir Hugh Anderson, Master of Caius College, died on Nov. 2nd at the age of 63, and the University of Cambridge thus loses a man whose services were of exceptional importance. A laboratory worker by choice and training, he became by force of circumstance an administrator, and besides the individual influence which he had always possessed, he came to have a general influence on the trend of education in this country. As initiator and negotiator of large policies he had difficult tasks to perform, but for him the sequel to new responsibilities was always an enlarged circle of respect and friendship.

SIR HUGH ANDERSON.

Hugh Anderson came of the well-known family of shipowners, his mother being a daughter of Surg.-General John Murray. He was educated at Harrow, where he was Sayer Scholar, and on going up to Caius College with an entrance scholarship he took a first in both parts of the Natural Sciences Tripos. Preferring scientific labours to the more lucrative business of shipping, he studied medicine at St. Bartholomew's Hospital, graduated as M.B. in 1891, and returned to Cambridge to work in the physiological laboratory. Until 1905, partly in conjunction with the late Prof. J. N. Langley, and partly alone, he pursued those researches which still form the classical description of the physiology of the sympathetic system in its relation principally to the eye and the pelvic viscera. Much of this investigation, which forms the substance of 28 papers in the *Journal of Physiology*, consisted in counting the number of degenerated and undegenerated nerve-fibres in a single nerve-trunk; for this purpose a short length of the nerve, stained by osmic acid, was teased out, each individual fibre being ranged alongside its fellow on the slide. At such work Anderson, like Langley, was a master, and he was also a very fine operator. His criterion of a proper operation for the excision of a stellate ganglion in the kitten was that it should be done without the shedding of a single drop of blood, and he was an expert in the use of special staining methods. Towards the end of his time in the laboratory he became interested in the histology of the spleen and of the red marrow, and might well have become a hæmatologist had not college finance and organisation stolen him from scientific study.

In 1907 Anderson was elected F.R.S., and five years later he was invited to be Master of his College, which had given him a belated Fellowship in 1897. The invitation came as a surprise and was accepted with characteristic diffidence. Apparently he did not see himself fit for this responsibility, but it was soon obvious to everyone else that the choice was happily inspired. His genius for detail, combined with a clear perception of principle, made him peculiarly

suited for such a post. He was a good judge of character; almost too modest by nature, he was free from any vestige of pompousness; and he was courteous, accessible, and sincerely cordial. He has been called the best beloved man of his generation in Cambridge, and when Caius was turned into a staff college during the war many an officer was grateful for the kindness with which Sir Hugh and Lady Anderson made him feel at home.

In the problems of the University after the war Anderson undoubtedly found scope for many of his talents, though the work may not have been what he would have chosen. Conspicuous capacity for business made him an acceptable collaborator in schemes both large and small, and to all of them, once he was convinced of their soundness, he gave an astonishing and self-sacrificing industry. Perhaps the greatest of his tasks was as member of the two university commissions, the first being that appointed in 1919 to consider the needs of Oxford and Cambridge, and the second being the University of Cambridge Statutory Commission which met in 1922. To his friends in Cambridge it seemed that he bore a great part of the weight of the whole proceedings, and he is credited with originating and carrying through many of the constructive proposals, including the provisions relating to the faculty system. On these commissions he was probably the University's most effective representative, and the Council of the Senate recently entrusted him with the delicate negotiations leading up to the Rockefeller Foundation's munificent proposal to give £700,000 to the University towards the cost of the new library and facilities for research. In all these negotiations it was characteristic of him that the financial authorities of the University, the heads of departments concerned, and the representatives of the Foundation should be able to place such confidence in his fairness and judgment that his scheme went through almost exactly as he outlined it.

From Prof. Joseph Barcroft we have received the following appreciation of his work as a physiologist:—

"My personal recollections of Anderson commence in 1893. He was then 'supervisor in physiology' to my own College, which meant, as far as we were concerned, that we went round to his room in Caius nominally for a class once a week. I there learned to know all the qualities which have won the affection, the respect, and the admiration of all who have come in contact with him. The class, perhaps of three, was supposed to last from 8 to 9 P.M.; we rarely came away before 11. During the three hours of its duration Anderson poured out the fruits of a mind entirely selfless, stimulating, rich in imaginative foresight, meticulous as regards correctness of detail, learned and, of course, honest to the very last. Naturally we left with the feeling that physiology was the one thing worth doing, and the life's work of one at least of his pupils was settled there and then.

"In the years which have passed since then Anderson never changed. His energies were devoted to larger objects, but his method remained essentially the same. He seemed to be able to spend endless time and pains over every difficulty, trifling or large, which his friends brought him—and they all did bring their troubles to him. His correspondence was written in his own hand (until shortly before his death); often he wrote the letters two or three times before they pleased him. He drafted reports in the same way. Had he university buildings under consideration his study table would be covered with plans drawn and coloured by himself. He gave himself without stint to every object which was thrust upon him, and the mystery remains unsolved by his friends of how within the 24 hours of a day he could give such detailed attention to so many subjects. Certainly the solution of that mystery did not lie either in superficiality or in failure of appreciation of large issues. Anderson never lost sight of the wood for the trees, nor in his consideration of the present forgot the possibilities of the future.

"When engaged in physiological research he was always giving of himself to the other workers in the laboratory, his sound critical faculty being helpful to whatever field it was directed. So it remained to the end. Shortly before his death, when he was bearing a weighty burden of affairs, a young worker wrote to him for advice on some matter touching the autonomic system. The next day Anderson made his way to the laboratory in London from which the query came, and devoted at least a couple of hours to the discussion of the problem at issue.

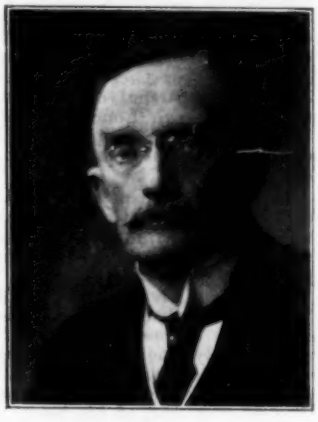
"There is no doubt that the accident of Anderson's diversion to administration (for I think it was largely an accident) was a great loss to science. Against it must be placed the gain which the Universities have reaped from his understanding knowledge of academic needs. Great at administration, he was no mere administrator. In matters financial the heads of departments must, I think, have always felt that in putting their case in Anderson's hands they were placing it where it would receive the greatest consideration, and where every effort would be made to get the most out of the available funds, rather than cut down expenditure irrespective of the loss entailed to academic life. He died in harness, and no better epitaph can be accorded to him than the remark of a friend: 'To have lived without being able to be useful would have been misery to Anderson.'"

At the time of his death Sir Hugh Anderson was a member of the Council of the Royal Society, having previously served in 1917–18. He was also a member of the Medical Research Council, and since 1908 had been chairman of the Syndicate of the Cambridge University Press. He was knighted in 1922, and for many years he had been a governor of Harrow School.

Lady Anderson is the daughter of Surgeon-General F. W. Innes.

FRANK JOSEPH WETHERED, M.D. LOND. AND BRIST., F.R.C.P. LOND.

Dr. F. J. Wethered, whose death at Falmouth on Oct. 28th was announced in our columns last week, had retired to the west country some ten years ago. Although since that time his visits to London were infrequent, he was held in warm remembrance by his colleagues at the hospitals for which he worked and by the staff of this journal, which owed much to his ever-ready help in criticism and comment.



DR. F. J. WETHERED.

Photograph by F. A. Swaine.

Born at Clifton in 1860, the son of Joseph Wethered, Frank was educated at Clifton College, the Bristol Medical School, where he demonstrated in anatomy, and the London Hospital, from which he qualified M.B. Lond., M.R.C.S. Eng., and L.S.A. in 1885. After holding a house appointment at the London Hospital, he visited some of the more famous continental clinics at Berlin and Vienna before taking his higher medical qualifications and beginning his life-work for the special chest hospitals at Victoria Park, City-road, and Brompton. He was appointed medical registrar and teacher of practical medicine to the

Middlesex Hospital in 1892, holding the former post for three years, and the latter until 1899, when he was appointed assistant physician, after which he had to wait for 14 years before becoming full physician with charge of beds; from this time until his resignation and retirement there was only a period of five years. With his clinical teaching he combined the post of lecturer at the medical school on medical jurisprudence, a subject in which his interest was by no means academic, for he was at pains, as many of his students gratefully remember, to make his lectures something more than a digest of text-book statements. He was also physician to St. Saviour's Hospital. During the greater part of this time, however, he had another outlet for his growing interest in pulmonary diseases, for in 1894 he was appointed assistant physician to the Brompton Hospital, becoming full physician in 1905, a position which he held for nearly 14 years, when he was appointed consulting physician. It was in the field of pulmonary tuberculosis that his advice as a consulting physician was most frequently sought, and his prize essay for the erection of King Edward VII. Sanatorium in 1902 showed how deeply and thoroughly he had thought out the problems of the treatment of tuberculosis, for his essay was in effect a summary of his own experience in the methods of increasing the resistance of the patient, of promoting and encouraging reparative processes, and of developing compensatory growth and function.

"Although Wethered achieved some success in consulting practice, it may be doubted," writes one of his colleagues, "whether this success was commensurate with his undoubted ability and attainments. Of upright, high-principled, and somewhat sensitive nature, the uncertainties of diagnosis and the disappointments of treatment not infrequently oppressed him. Quite early in his professional career he was attracted to the more exact methods of diagnosis, and in 1890 he collaborated with Dr. W. Essex Wynter in the production of a 'Guide to Methods of Clinical Investigation,' one of the early works in English on this subject, showing how clearly the authors foresaw the trend of modern medical practice. The book covered a very wide field, and abounded in practical hints of value to the student, avoiding anything discursive or irrelevant, and the illustrations were a model of excellence for their time. The marriage of his daughter to the late Dr. A. Conyers Inman, clinical pathologist to the Brompton Hospital, later revived Wethered's interest in this subject, and stimulated him to a careful trial of vaccines in the treatment of pulmonary affections. It was the death of Mrs. Inman, his dearly loved only child, as a direct consequence of an infection acquired during war work in hospital, together with his own increasing susceptibility to catarrhal conditions, that determined his retirement from London, although the stress of his work as Captain, R.A.M.C. (T.), at No. 3 London General Hospital, Wandsworth, no doubt contributed to his decision."

Outside his hospital work Dr. Wethered acted as medical adviser to the Equity and Law Life Assurance Society, and examined in medicine for the Royal College of Physicians of London. He was examining physician in London to the Ventnor Consumption Hospital and treasurer to the Medical Defence Union. "All the work Wethered undertook," continues his colleague, "was carried out conscientiously and unstintingly, including arduous work on committees and administrative duties. It was, however, as host in his charmingly furnished house in Harley-street that he was seen at his best. He loved to entertain his friends, colleagues, and hospital assistants. This he did generously and informally, and at these times the happiness of his home life and the devotion of wife and daughter were apparent to all. Wethered will live long in the memory of his friends as a generous, honourable, and loyal man."

After his retirement to Falmouth Dr. Wethered took an active part in the life of the town. He was a consulting physician at the Falmouth Hospital, for a time also at the Royal Cornwall Sailors' Hospital, and he placed his knowledge and experience at the disposal of the staff of Tehidy Sanatorium. He was a member of the local church council and a regular supporter of the Falmouth Parish Church. His leisure gave him the desired opportunity to indulge in the outdoor sports of which he had always been fond, especially sea-fishing.

Dr. Wethered married, in 1889, Rose, daughter of the late Edward How, who survives him. The interment at St. Marylebone Cemetery on Nov. 1st was attended by many of his old friends and colleagues as a mark of affection and esteem.

SIR GEORGE STEWART ABRAM, M.B. CAMB., M.R.C.S. ENG.

THE death of Sir Stewart Abram, which occurred on Oct. 24th at the age of 62 years, robs the Royal Berks Hospital of its senior physician and the town of Reading of one of its most distinguished citizens.

Son of George Abram, of Middle Temple-lane, he was educated at Merchant Taylors' School and at Caius College, Cambridge, where he took a second class in the Natural Science Tripos. From Cambridge he went on to University College Hospital, London, where he obtained the gold medal in midwifery and won distinction in clinical medicine before qualifying as M.B., B.Chir. Camb. in 1891 and taking his conjoint qualification in the same year. He then served as house physician at his own hospital and assistant house surgeon at the Devon and Exeter Hospital. In 1893 he settled in Reading, where he soon acquired an extensive practice and was appointed to the honorary staff of the Royal Berks Hospital in 1904. His clinical work was marked with a strong vein of common sense and a catholicity of interest which is shown in a number of short communications at various times to our own columns. But Abram did not confine his energies to purely professional work. A man of great personal gifts and of indefatigable energy, he was elected shortly after his advent in Reading a member of the town council, serving on it for over 30 years and becoming in 1908 chairman of the health committee, in the work of which he took a leading part; for a considerable period he was also chairman of the Reading Education Committee. In 1919 he was elected an alderman of the borough and was straightway chosen to be Mayor. During his period of office he was mainly responsible for the Reading Historical Pageant, in which he himself was a notable figure. He was also a governor of Reading School, a member of the Court of the University of Reading, an ex-President of the Reading Pathological Society, and a member of numberless charitable, welfare, and athletic committees.

SIR STEWART ABRAM.

Photograph by Drake, Reading.

In addition to these varied activities Abram led a busy political life; he was a strong Conservative and

a source of strength to the organisation of the party in the town. For many years he was chairman and, of late, President of the Reading Conservative and Unionist Association. A fluent and graceful speaker, he was in request at both political and non-political gatherings. In January, 1922, his public services were recognised by the conferment of a knighthood. During the war he was a territorial major in the Royal Army Medical Corps and was in command of one of the large war hospitals in Reading. He was interested in all kinds of sport, was an active tennis player, and an amateur actor of some ability.

A few years ago Sir Stewart Abram developed a malignant growth for which he underwent a severe operation. This, on the testimony of a friend and colleague, he faced in the most courageous manner, going about his ordinary work cheerfully until the eve of his admission to the nursing home. After his convalescence he returned to all his activities, in spite of obvious disabilities and to the wonder of all. "Supported," writes W. B. S., "as he had always been, by his heroic wife, he afforded a fine example of pluck in the face of what must have been continual anxiety. As the years went by all hoped that he had been permanently cured, but in the summer of this year lung symptoms commenced, due to a recurrence of the disease. He had always said that he would die in harness, and he continued at work until a week before his death. Abram loved his work and he loved his town. It can truly be said that few men have laboured so unceasingly for the good of their fellows. His untiring energy was amazing. His life's work has indeed been well done."

Owing to his great services to Reading it was recently decided to confer the freedom of the borough on Sir Stewart Abram. It was recognised that the time was short and the presentation was made and the roll signed in his bedroom some seven hours only before he died.

He leaves a widow, a son, and two married daughters.

THE photograph of Sir Charles Tomes in our last issue was by Elliott and Fry, Ltd.; that of Mr. Louis Cassidy by Lafayette.

Medical News.

ROYAL COLLEGES OF PHYSICIANS OF LONDON AND SURGEONS OF ENGLAND.—As the result of the Final Conjoint Examination held from Oct. 1st to 23rd the following candidates were approved in the undermentioned subjects, but are not eligible for diplomas:—

Medicine.—S. S. Ahluwalia, Univ. Coll.; Annie G. Busher, Royal Free; W. J. Cotton and R. Cutler, Guy's; Catherine Day, Royal Free; H. A. Eason, London; Mary G. H. Edwards, St. Mary's; J. A. Fernandez, Univ. Coll.; W. R. Forrester Wood, Cambridge and St. Bart.'s; Joan Goodger, Charing Cross; Margaret L. Hamburger, Royal Free; E. J. Hamp and J. M. Harker, London; A. H. Hussein, Cairo; A. E. Hutton, Westminster; M. Luckeenarain and Dorothy M. Lufkin, Univ. Coll.; R. Machray, Westminster; R. S. Marya, A. Mathews, and M. V. Modi, London; Jocelyn A. M. Moore, Royal Free; W. R. C. Morris, London; B. A. Moss, Guy's; J. E. Myers, London; T. H. Negus, St. Thomas's; J. C. Nicholson, Oxford and St. Bart.'s; W. G. Oakley, Cambridge and St. Bart.'s; A. F. Parker, London; W. Pearce, Leeds; G. E. A. Prins, St. Mary's; Marjorie E. Roberts, Royal Free; J. D. Simpson, Cambridge and London; A. E. M. Soliman, Cairo and London; C. M. E. Warner, King's Coll.; S. A. Wickremasinghe, St. Bart.'s; A. W. Williams, Cambridge and Westminster; J. D. Williams, Cardiff; Beatrice M. Willmott, Cambridge and Birmingham; and Mary Worthington, Royal Free.

Midwifery.—G. G. Allan, Cambridge and Univ. Coll.; K. Alman-Vtcherashnia, Kiev and Royal Free; R. W. F. Alles, Middlesex; S. Annaswami, Madras; C. Arthur, Cambridge and St. George's; F. I. Ashton, St. Thomas's; Kathleen W. Aylwin-Gibson, Westminster; C. P. Bailey, Cambridge and St. George's; D. P. Bali, Punjab; T. S. Belcher, London; H. J. W. Bergh, St. George's; W. R. Bett, St. Bart.'s; G. R. Bhatia, Middlesex; D. Bielenky, Westminster; M. Bloom, Cardiff; J. J. Boulle, London; B. H. A. Bovet, Guy's; Bertha A. Briant, Royal Free; J. Britanischski, Berlin and London; T. D. T. Brocklehurst and J. G. Q. Brown, Guy's; V. I. C. Cadogan, Univ. Coll.; P. Chandra, Punjab and St. George's; H. L. Chopra, Punjab; Mabel J. Cooke, Royal Free; F. S. Cooksey, King's Coll.; C. F. Cosin, Guy's; S. T. Crowther, Cardiff; R. Cutler, Guy's; J. H. Cyriax, Cambridge and St. Thomas's; Catherine Day, Royal Free; E. M. Dimock, Cambridge and Univ. Coll.; Jessie E. Dodds, Sheffield; A. Eckford, Guy's; J. A. Eddy, Oxford and Middlesex; L. M. Edwards, St. Bart.'s; A. C. Elkin, Univ. Coll.; R. B. H. Faichney, Liverpool; T. D. Finey, London; A. W. Franklin, Cambridge and St. Bart.'s; T. Fritz, London; L. Gabbe, Guy's; T. C. R. George, St. Bart.'s; N. D. Gerrish, Bristol; W. S. Ghai, Charing Cross; P. J. E. Godard, Paris and Lausanne; M. W. Gonin, St. Bart.'s; A. J. Groenewald, Guy's; E. Grundy, Leeds; L. Grunis, London; A. S. Hall, Cambridge and St. George's; Margaret L. Hamburger, Royal Free; P. N. Hanson, St. Bart.'s; H. M. Harris, Oxford and London; G. F. Harrison, St. Thomas's; K. W. D. Hartley, St. Bart.'s; Columba M. D. Heathcote, Charing Cross; F. F. Hellier, Cambridge and Leeds; A. H. Hennessy, Adelaide and London; R. Herring, St. Mary's; R. C. Holderness, Leeds; F. W. Holdsworth, Cambridge and St. George's; G. J. Hollis, Guy's; Ethel E. Hopper, Charing Cross; C. Hortop and A. D. H. Hugo, Guy's; E. F. Hunt, St. George's; R. I. Hyder, London; C. G. Jobbins, Cambridge and St. Thomas's; C. Jones, Leeds; H. W. Jordan, Univ. Coll.; D. W. S. Kaye, King's Coll.; M. S. Khan, Cambridge and Middlesex; T. H. Khan, King's Coll.; R. J. Krogh, Bristol; S. Lal, Lahore; A. J. C. Latchmore, Leeds; C. Leben, Univ. Coll.; A. Liberis, St. Bart.'s; P. A. T. Lowden, St. Thomas's; J. V. Lucas, Cambridge and Bristol; H. G. McGregor, Guy's; S. I. McMillen, Pennsylvania; F. M. Mallinson, Univ. Coll.; R. S. Mann, Cambridge and Univ. Coll.; F. W. Marshall, King's Coll.; R. S. Marya, Punjab and London; A. Mathews, London; V. L. Misso, Singapore and King's Coll.; S. N. Mistri and W. R. C. Morris, London; Margaret Naylor, Sheffield; A. H. Nelson, Charing Cross; R. J. L. O'Donoghue, Guy's; B. W. Paine, Univ. Coll.; C. T. E. Parsons, St. Bart.'s; T. B. Pitts, Guy's; R. K. Price, St. Bart.'s; F. S. C. Pritchard, Guy's; R. Purvis, St. Thomas's; Alison J. Rae, Royal Free; T. V. Rajagopalan, Madras; A. B. Rao, Middlesex; B. V. P. Reddy, London; P. J. Richards, Cambridge and St. Bart.'s; A. C. Riley, St. Bart.'s; Marjorie E. Roberts, Royal Free; Ivy H. V. Rowlands, Liverpool; C. R. Salkeld, Oxford and St. Thomas's; R. M. Sargent, Univ. Coll.; T. L. Scott, St. Mary's; S. Segalov, St. Bart.'s; Sybil C. Selby-Green, Westminster; W. H. H. Serasinghe, Middlesex; V. Seshagiri-Rao, Madras; E. M. Sharples, St. Bart.'s; H. J. Shorvon, St. Thomas's; A. D. Skyrme, Cambridge and London; A. M. Soliman, Cairo and London; H. Stark, St. Bart.'s; Ada M. W. Stewart, Liverpool and Univ. Coll.; G. D. Stilwell, St. Thomas's; L. Sumitra, St. Mary's; E. C. Sugden, Cambridge and St. Bart.'s; B. L. Taneja, Lahore and Guy's; H. Taylor, Cambridge and St. Bart.'s; V. C. Thompson and C. R. Todd, St. Bart.'s; Decima M. Tracey, Royal Free; A. E. Treweek, Guy's; D. P. Turner, King's Coll.; G. E. M. Turner, Middlesex; G. Vaishnavi, Punjab; J. J. van Niekerk, Guy's; Frances J. Vinter, Royal Free; W. E. Wainman, Leeds; W. J. Walter, Oxford and St. Bart.'s; V. W. L. Wells, Guy's; S. A. Wickremasinghe, Ceylon and St. Bart.'s; S. J. Wheeler, Guy's; R. P. White, Cambridge and St. Bart.'s; D. C. Williams, Cardiff; J. O. Williams, St. Bart.'s; Sibyl O. Williams, Calcutta and Royal Free; E. R. Willis, London; Beatrice M. Willmott, Cambridge and Birmingham; B. Wright, Cambridge and St. Bart.'s; Winifred M. Wright, Royal Free; P. Yarmarko and D. J. Young, Middlesex; and R. H. Young, Cambridge and St. Thomas's.

Surgery.—W. Addey, Manchester; C. L. Ahluwalia, Charing Cross; C. Arthur, St. George's; M. W. Atkinson, Middlesex; R. C. Bennett, St. Bart.'s; A. D. D. Broughton, London; G. H. Buck, Oxford and Westminster; G. C. Cochrane, London; J. E. Curnock, Charing Cross; E. M. Dimock, Univ. Coll.; J. A. Eddy, Middlesex; M. A. A. El Gammal, Cairo; A. C. Elkin, Univ. Coll.; T. C. J. Evans, St. Mary's; A. D. Everett, St. Bart.'s; R. B. H. Faichney, Liverpool; E. Foster, Cardiff; P. J. E. Godard, Paris and Lausanne; M. W. Gonin, St. Bart.'s; A. J. Groenewald, Guy's; R. G. Gwynne, Adelaide and London; A. S. Hall, St. George's; H. M. Harris, Oxford and London; G. F. Harrison, St. Thomas's; Dorothy C. Hay, King's Coll.; W. Heath, St. Bart.'s; C. E. Holden, Cambridge and St. Bart.'s; F. W. Holdsworth, Cambridge and St. George's; G. J. Hollis, Guy's; R. G. S. Howe, Univ. Coll.; A. E. Hutton, Westminster; R. I. Hyder, London; D. E. Hyman, Manchester; C. G. Jobbins and W. H. P. Jonas, St. Thomas's; C. Jones, Leeds; H. W. Jordan and C. Leben, Univ. Coll.; L. C. Lodge, Middlesex; R. Machray, Westminster; F. W. Marshall, King's Coll.; R. A. Maynard, Cambridge and St. Thomas's; J. C. Nicholson, Oxford and St. Bart.'s; P. L. Nirula, Punjab; T. Parakutty-Ammal, Royal Free; E. R. G. Passe, London; F. Pomarantz, St. Bart.'s; R. Purvis, St. Thomas's; Florence Ram, Cambridge and Sheffield; A. B. Rao, Middlesex; A. C. Riley, St. Bart.'s; E. B. Rogers, Guy's; B. Rothery, St. George's; A. S. D. Russell, St. Thomas's; T. L. Scott, St. Mary's; J. D. Simpson and B. Singer, London; E. Sladen and C. E. Soodeen, Middlesex; B. Stanley, Univ. Coll.; E. T. W. Starkie, St. Mary's; E. C. Sugden, Cambridge and St. Bart.'s; Bertha D. Upton-Jones, Royal Free; E. Vitenson, Guy's; W. E. Wainman, Leeds; R. P. White and A. G. Williams, St. Bart.'s; Kathleen Wilson, King's Coll.; and W. R. Winterton and M. R. Zada, Middlesex.

Pathology.—A. D. Everett, St. Bart.'s; A. Gilpin, King's Coll.; E. Grundy, Leeds; J. M. Harker, London; R. C.

Holderness, Leeds; Geraldine J. G. Hayes, Manchester; D. W. S. Kaye, King's Coll.; S. D. McClean, Guy's; J. R. Owen, Birmingham; R. A. C. Rice, St. Bart.'s; T. S. Rodgers, Westminster; C. Skinner, Guy's; A. R. Smith, St. Thomas's; I. Taylor, King's Coll.; and A. Wiseman, Guy's.

UNIVERSITY OF OXFORD.—The following scholarships have been awarded:—Theodore Williams Scholarship in Physiology: Robert A. Beaver. Theodore Williams Scholarship in Anatomy: Renatus Kempthorne and Aldwyn B. Stokes, B.A. (equal). Theodore Williams Scholarship in Pathology: Frank Hawking. Radcliffe Scholarship in Pharmacology: Hedley John Barnard Atkins and John Henderson Hunt (equal).

UNIVERSITY OF CAMBRIDGE.—It is proposed to confer the honorary degree of Master of Arts upon Mr. W. H. Bowen, F.R.C.S., surgeon to Addenbrooke's Hospital.

UNIVERSITY OF EDINBURGH.—Sir Leybourne Davidson has given £5000 to found and endow a Fellowship in Bacteriology and Immunology in the University.

ROYAL SOCIETY OF ARTS.—The Cantor lecture on Biology and Refrigeration will be delivered by Mr. Franklin Kidd, D.Sc., on Nov. 12th, at 8 P.M., at the house of the Society at John-street, Adelphi, London, W.C.

BRITISH INSTITUTE OF PHILOSOPHICAL STUDIES.—Dr. C. S. Myers, F.R.S., will take the chair at a lecture on Race and Civilisation, to be given by Mr. Morris Ginsberg at 8.15 P.M., on Tuesday, Nov. 13th, at the Royal Society of Arts, 18, John-street, Adelphi, W.C.

MEDICO-LEGAL SOCIETY.—A meeting will be held at 11, Chandos-street, Cavendish-square, London, W., on Nov. 22nd, at 8.30 P.M., when a paper will be read by Dr. L. A. Weatherly on Juvenile Psychologic Delinquencies—their Origin and Treatment, which will be followed by a discussion.

WEST KENT MEDICO-CHIRURGICAL SOCIETY.—A meeting of this Society will be held at the Miller General Hospital, Greenwich, to-day, Friday, Nov. 9th, at 8.45 p.m., when Mr. C. A. Joll, the President, will take the chair, and Dr. J. A. Ryle will give an address on Some Symptoms and Consequences of Arterial Disease.

LONDON CLINIC FOR RHEUMATISM.—Sir Otto Beit, who in May last gave £10,000 in answer to the British Red Cross Society's appeal for £40,000 to establish a clinic in London for the treatment and study of rheumatic diseases, has now sent a further donation of £3474 18*s.* 9*d.*, being the amount required to complete the sum asked for.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.—The annual dinner of this society will be held at the Piccadilly Hotel, W., on Thursday, Nov. 15th, at 7.30 P.M. (Reception at 7.10 P.M.) Ladies are invited, and members, or candidates nominated for election, are asked to give early notice to the executive secretary of their intention to be present, with the names of their guests.

ABERDEEN UNIVERSITY CLUB, LONDON.—This club will hold its eightieth half-yearly dinner at the Trocadero Restaurant on Nov. 22nd, with Lord Meston, Chancellor of the University, in the chair, and with the Earl of Birkenhead, Rector of the University, as principal guest. Application for tickets to the secretary, 9, Addison-gardens, Kensington, W. 14.

COLLEGE OF NURSING.—Miss Cox-Davies, C.B.E., has been appointed president of the College in succession to Miss Gill, who has retired owing to ill-health. At one time matron of the Royal Free Hospital, London, Miss Cox-Davies was a principal matron of the Territorial Army Nursing Service during the war, and was decorated with the Royal Red Cross and bar. She is a member of the General Nursing Council.

DONATIONS AND BEQUESTS.—Under the will of the late Mr. E. Freaker, of Windsor, who left the residue of his estate to King Edward VII. Hospital, that institution will receive about £10,000.—Mr. William Greenwood, of Lytham, Lancs, left £1000 to the Rochdale Infirmary and £500 to the Cottage Hospital, Lytham.—The Invalid Children's Aid Association of Manchester and Salford has received an anonymous gift of £1000.—Mr. Maximilien Maurice Samuel, of Willesden-lane, London, on his wife's decease, left £1000 to the Willesden General Infirmary.—Mr. Levy, chairman of the Ardath Tobacco Co., Ltd., has given £2000 to the New Bethlem Hospital Building Fund.

ROYAL SOCIETY.—At the anniversary meeting on Nov. 30th the President and Council will recommend that Dr. H. H. Dale be re-elected as one of the society's two secretaries, whilst Dr. Charles Bolton, Dr. C. G. Douglas, Sir Frederick Hopkins, Prof. J. C. G. Ledingham, and Prof. G. Elliot Smith are among the Fellows nominated to the Council.

THE IRIS FOX MEMORIAL.—The Committee of this Fund announce that a total of £355 has been collected, and that it is proposed to utilise the money for a pathological library at the Royal Free Hospital to be named the Iris Fox Library.

Dr. Thomas Goodall Nasmyth has been appointed a Deputy Lieutenant of Edinburgh.

Dr. Herbert Gordon Thompson has resigned his post in charge of the Church Missionary Society's Hospital at Hangchow, China, on being appointed to the Chair of Surgery at the Henry Lester Institute, Shanghai.

UNIVERSITY OF LONDON MEDICAL GRADUATES' SOCIETY.—The autumn dinner of this society was held at the Langham Hotel, London, on Oct. 31st, with the President, Sir StClair Thomson, in the chair, and Dr. M. Hajek, Professor of Rhino-Laryngology in the University of Vienna, and Dr. Waldapfel, his assistant, as the guests of honour. After referring to the increasing membership of the society, which now includes 200 life members, he pointed out that the medical graduates of the University numbered upwards of 4500, and expressed a hope that a larger proportion would join as time went on. He expressed the society's welcome to Prof. Hajek, who responded. Mr. W. McAdam Eccles recounted the success achieved in the Birmingham area through the energy and initiative of Prof. W. Billington, in consequence of which the first extra-metropolitan dinner of the society will be held in Birmingham on Nov. 23rd at 7.30 P.M., in the Queen's Hotel, with Sir StClair Thomson in the chair. Sir Holburt Waring then described some of the latest developments with regard to the Bloomsbury site. He stated that 11 acres had been acquired for £535,000, consisting of four blocks through which ran two roads cross-wise. At present the University was receiving £14,000 per annum in rentals from these buildings. Legislation had had to be sought by which the University would be enabled to close these two intersecting roads, the roads to the south and east sides of the area being widened as a compensatory measure. The necessary powers had been successfully achieved, with the help of the London County Council, and the University was now able to go ahead with the development scheme. The authorities were now trying to decide what institutions, colleges, and special departments should be erected upon the site. When this had been decided, after consultation with the various bodies concerned, designs for the whole plan of the area would be invited from leading architectural authorities. The purchase of the site had been finally accomplished by arrangement with the Treasury, the Rockefeller Institute, and the University trustees.

Medical Diary.

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

MONDAY, Nov. 12th.—5 P.M., WAR. Paper: Major W. D. Keyworth, I.M.S.: Severe Malaria among British Troops in the East African Campaign. (Communicated by Major Herrick, I.M.S.)

TUESDAY.—5 P.M., THERAPEUTICS AND TROPICAL DISEASES. Joint discussion on the Special Uses of Antimony. Opener: Dr. J. B. Christopherson. Other Speakers: Prof. A. J. Gunn, Sir Leonard Rogers, and others. 8.30 P.M., PSYCHIATRY. Presidential Address: Sir Maurice Craig: A Survey of Some Conditions Conducive to Mental Disturbance, with Suggestions as to Their Treatment.

WEDNESDAY.—5.30 P.M., SURGERY: SUBSECTION OF PROCTOLOGY. Discussion on Urinary Infections after Excision of the Rectum: Their Cause and Prevention. To be opened by Dr. Cuthbert Dukes. Demonstration of pathological specimens. 8.15 P.M., ELECTRO-THERAPEUTICS. Mackenzie Davidson Memorial Lecture: Prof. W. L. Bragg: X Ray Optics (illustrated by experiments). (*Note.*—There will be no meeting of the Section of Electro-Therapeutics on Friday, Nov. 16th.)

THURSDAY.—5 P.M., DERMATOLOGY. (Cases at 4 P.M.) Cases: Dr. H. C. Semon: Keratodermia Punctata. Other cases will be shown. Annual Dinner of the Society: May Fair Hotel, W. 1, 7.30 for 8 P.M.

FRIDAY.—8 P.M., OBSTETRICS. Short Communication: Dr. J. D. Barris and Dr. Wilfred Shaw: Rhabdomyosarcoma of the Ovaries. Papers: Prof. Donald and Prof. Fletcher Shaw: Age-incidence in Carcinoma of the Body of the Uterus. Dr. James Young (Edinburgh): The Prognosis and Treatment of Late Pregnancy Toxæmia.

MEDICAL SOCIETY OF LONDON, 11, Chandos-street, Cavendish-square, W.

MONDAY, Nov. 12th.—8.30 P.M., discussion on the Medico-Legal Aspects of Fractures, to be introduced by Prof. E. Hey Groves and Dr. James Neal.

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE.

THURSDAY, Nov. 15th.—8.15 P.M. (at the London School of Hygiene and Tropical Medicine, Endsleigh-gardens, Euston-road, W.C.), Laboratory Meeting. Demonstrations by Major H. C. Brown and Dr. W. T. C. Broom; Dr. P. A. Buxton; Dr. L. J. Davis; Mr. B. Joblin; Dr. Salisbury Sharpe; Miss E. K. Sikes; Dr. A. C. Stevenson; Dr. C. M. Wenyon and Dr. E. Hindle; Dr. V. B. Wigglesworth; and Prof. Warrington Yorke. A cinematograph film will also be shown entitled Scenes in the Kala-azar Endemic Areas in Bengal, by Dr. L. E. Napier, of Calcutta.

BIOCHEMICAL SOCIETY.

FRIDAY, Nov. 16th.—5 P.M. (in St. Thomas's Hospital Medical School). Communications:—V. B. Reader: A Third Factor Present in Marmite, Necessary for the Nutrition of the Rat. H. J. Holman and S. B. Schryver: The Separation of the Basic Products of the Hydrolysis of Proteins. J. R. Marrack: Ketosis in Sea-sickness. L. J. Harris and T. Moore: Hypervitaminosis. M. G. Eggleton and P. Eggleton: A Method of Estimating Phosphagen and other Phosphorus Compounds in Voluntary Muscle. W. J. N. Burch: A Synthesis of Hydroxyglutamic Acid. W. J. N. Burch and R. H. A. Plimmer: Esters of Phosphoric Acid. J. Lowndes and R. H. A. Plimmer: Bromination of Histidine. R. H. A. Plimmer, W. H. Raymond, and J. Lowndes: Comparative Vitamin B Values of Foodstuffs. H. Allen, F. Dickens, E. C. Dodds, and F. C. Howitt: A Study of the Œstrus-producing Hormone, with Special Reference to its Preparation and Standardisation in a Water-soluble Form.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

WEST LONDON POST-GRADUATE COLLEGE, West London Hospital, Hammersmith, W.

MONDAY, Nov. 12th.—10 A.M., Dr. Dowling: Skin Department. 11 A.M., Mr. Tyrrell Gray: Surgical Wards. 2 P.M., Mr. Simmonds: Surgical Out-patients.

TUESDAY.—11 A.M., Mr. Endean: Venereal Diseases (demonstration). 2 P.M., Dr. Shaw: Medical Out-patients. 2 P.M., Mr. Hamblen Thomas: Throat, Nose and Ear Department.

WEDNESDAY.—10 A.M., Dr. Burnford: Medical Wards. 2 P.M., Mr. Tyrrell Gray: Operations. 2.30 P.M., Mr. Donald Armour: Surgical Wards.

THURSDAY.—10 A.M., Dr. Grainger Stewart: Neurological Department. 2 P.M., Dr. Ironside: Medical Out-patients. 2 P.M., Mr. Bishop Harman: Eye Department.

FRIDAY.—10 A.M., Dr. Pritchard: Medical Wards. 2 P.M., Mr. Sinclair: Surgical Out-patients. 2 P.M., Mr. Vlasto: Throat, Nose and Ear Department. 4.30 P.M., Special lecture: Mr. Vlasto: Hoarseness.

SATURDAY.—9 A.M., Mr. Vlasto: Operation on Throat, Nose and Ear. 9.30 A.M., Dr. Burnford: Bacterial Therapy Department. 10 A.M., Dr. Owen: Medical Diseases of Children.

Daily 10 A.M. to 5 P.M., Saturdays 10 A.M. to 12 noon. Medical and Surgical In-patients and Out-patients. Operations, Special Departments, Anæsthetic Course.

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.

MONDAY, Nov. 12th.—2.30 to 5 P.M.: Medical, Surgical, and Gynæcological Clinics. Operations.

TUESDAY.—2.30 to 5 P.M.: Medical, Surgical, Throat, Nose and Ear Clinics. Operations.

WEDNESDAY.—2.30 to 5 P.M.: Medical, Skin and Eye Clinics. Operations.

THURSDAY.—11.30 A.M.: Dental Clinics. 2.30 to 5 P.M.: Medical, Surgical, and Ear, Nose and Ear, Nose and Throat Clinics. Operations.

FRIDAY.—10.30 A.M.: Throat, Nose and Ear Clinics. 2.30 to 5 P.M.: Surgical, Medical, and Children's Diseases Clinics. Operations.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

MONDAY, Nov. 12th, to SATURDAY, Nov. 17th.—MEDICAL SOCIETY OF LONDON, 11, Chandos-street, Cavendish-square, W. Lecture by Dr. H. C. Semon: Some Basic Remedies in Diseases of the Skin, on Mon., at 5 P.M.—WELLCOME MUSEUM OF MEDICAL SCIENCE, 33, Gordon-street, W.C. Wed., at 4 P.M., demonstration by Colonel L. W. Harrison: Syphilis Now and Twenty Years Ago.—CENTRAL LONDON OPHTHALMIC HOSPITAL, Judd-street, W.C. Mon., at 4.30 P.M. clinical demonstration by Mr. Williamson-Noble. There are no fees for the above.—SOUTH LONDON HOSPITAL FOR WOMEN, 103, South Side, Clapham Common, S.W. Fri., at 2 P.M., clinical demonstration by Miss Davies-Colley and her colleagues. This demonstration is free to women graduates *only*.—ROYAL WATERLOO HOSPITAL FOR WOMEN AND CHILDREN, Waterloo-road, S.E. Special post-graduate course in medicine, surgery, and gynæcology.—ROYAL WESTMINSTER OPHTHALMIC HOSPITAL, Broad-street, Holborn, W.C. Special course in ophthalmology.—ST. MARK'S HOSPITAL, City-road, E.C. One week's special course. Further information from the Secretary.

HOSPITAL FOR SICK CHILDREN, Great Ormond-street, W.C.

THURSDAY, Nov. 15th.—4 P.M., Dr. Frew: Enuresis.

CENTRAL LONDON THROAT, NOSE AND EAR HOSPITAL, Gray's Inn-road, W.C.

FRIDAY, Nov. 16th.—4 P.M., Diseases of the Maxillary Antrum.

ROYAL NORTHERN HOSPITAL, Holloway-road, N.

TUESDAY, Nov. 13th.—3.15 P.M. (at the Royal Chest Hospital), Dr. P. Kerley: The X Ray Diagnosis of Pulmonary Tuberculosis.

ST. PAUL'S HOSPITAL POST-GRADUATE COURSE, Endell-street, W.C.

WEDNESDAY, Nov. 14th.—4.30 P.M., Mr. H. P. Winsbury White: Stone in the Upper Urinary Tract.

UNIVERSITY COLLEGE, Gower-street, W.C.

MONDAY, Nov. 12th.—5 P.M., Prof. E. B. Verney: Urinary Secretion. (Fifth lecture.)

WEDNESDAY.—5.30 P.M., Dr. J. Owens, A.M.I.C.E.: Smoke Pollution of the Air and Public Health. (Last lecture.)

FRIDAY.—5 P.M., Prof. J. C. Drummond: Recent Work on Vitamins. (Last lecture.)

ROYAL INSTITUTE OF PUBLIC HEALTH, 37, Russell-square, W.C.

WEDNESDAY, Nov. 14th.—4 P.M., Dr. R. H. B. Adamson: The Health of Women and Girls in Relation to Industry.

CHADWICK PUBLIC LECTURES.

MONDAY, Nov. 12th.—8 P.M. (at Royal Institution of Civil Engineers, Great George-street, Westminster), Mr. H. E. Stilgoe, M.Inst.C.E.: Some Aspects of the London Water-supply.

LONDON SCHOOL OF DERMATOLOGY, St. John's Hospital, 49, Leicester-square, W.C.

TUESDAY, Nov. 13th.—5 P.M., Dr. Wilfrid Fox: Nævi.

THURSDAY.—5 P.M., Dr. I. Muende: Pathology Demonstration.

UNIVERSITY OF SHEFFIELD POST-GRADUATE CLINICS.

FRIDAY, Nov. 16th.—3.30 P.M., Mr. Mouat: Surgical Cases.

MANCHESTER ROYAL INFIRMARY POST-GRADUATE COURSE.

TUESDAY, Nov. 13th.—4.15 P.M., Dr. W. Dyson: Demonstration of Dermatological Cases.

FRIDAY.—4.15 P.M., Dr. W. G. Thomson: Certification in Lunacy.

ANCOATS HOSPITAL POST-GRADUATE LECTURES, Mill-street, Manchester.

THURSDAY, Nov. 15th.—3.45 P.M., Dr. Renshaw: Urine—Laboratory Aids to Diagnosis.

Appointments.

FALLON, M. F., M.B., B.Ch. Belf., has been appointed Assistant Medical Officer of Health for Bury, Lancashire.

Certifying Surgeons under the Factory and Workshop Acts: DAVIES, A. J. M., L.M.S.S.A. (Corris, Merioneth); HERINGTON, C. E. E., M.B., B.S. Lond., D.P.H. (Erith, Kent.); and WYSARD, A. T., L.R.C.P. Lond., M.R.C.S. (Pangbourne, Berks).

Vacancies.

For further information refer to the advertisement columns.

Birmingham and Midland Homœopathic Hospital, Easy-row.—H.S. £150.

Birmingham, Midland Ear and Throat Hospital.—Asst. Surg. O. Also Second H.S. £200 and £150 respectively.

Birmingham, Queen's Hospital.—Asst. Ophth. Surg. £50.

Cambridge, Papworth Village Settlement.—H.P. At rate of £100.

Cardiff, King Edward VII. Welsh National Memorial Association. Asst. Tuber. P. £600. Also Third Asst. Res. M.O. to N. Wales Sanatorium, Llangwyfan. £200.

Chester, Royal Infirmary.—Three H.S.'s. Each £120.

City of London Hospital for Diseases of the Heart, &c., Victoria Park, E.—Res. M.O. £250. Also H.P. At rate of £100.

Croydon, General Hospital.—Res. M.O. £200.

Dreadnought Hospital, Greenwich.—Med. Supt. £300.

Dublin, Royal City of Dublin Hospital, Upper Baggot-street.—Visiting Gynæcologist.
Dudley, Guest Hospital and Eye Infirmary.—H.S. Also Asst. H.S. £175 and £150 respectively.
East London Hospital for Children, &c., Shadwell, E.—Asst. Surg.
Elizabeth Garrett Anderson Hospital, Euston-road.—Clin. Assts.
Exeter City.—Asst. M.O.H., &c. £600.
Exeter, Wonford House.—Jun. Asst. M.O. £300.
Frimley, Hospital for Consumption Sanatorium.—Sen. and Jun. H.P.'s. At rate of £150 and £100 respectively.
Halifax County Borough.—M.O.H. £1000.
Hampstead General and North-West London Hospital, Haverstock Hill, N.W.—Hon. Ophth. Surg.
Harefield, Middlesex, County Sanatorium.—Third Asst. Res. M.O. £400.
Hospital for Sick Children, Great Ormond-street, W.C.—H.P. and H.S. Each at rate of £100. Also Res. M.O. for Country Branch Hospital, Tadworth, Surrey. At rate of £250.
Hospital for Women, Soho-square, W.—Pathologist and Registrar. £100.
Huddersfield Royal Infirmary.—H.S. £150.
Hull, Royal Infirmary.—Second H.S. At rate of £150.
King's College Hospital, Denmark Hill, S.E.—Sister-Matron. Also Supernumerary Jun. Ophth. Surg.
L.C.C. Mental Hospitals Service.—Eighth Asst. M.O. £300.
Leeds, St. James's Hospital.—H.P. and S. £200.
London Jewish Hospital, Stepney Green, E.—Hon. Asst. Phys.
Manchester Victoria Memorial Jewish Hospital, Cheetham.—Jun. H.S. At rate of £125.
Mildmay Mission Hospital, Austin-street, Bethnal Green, E.—Hon. Dental Surg.
Nottinghamshire County Council.—Tuberculosis Officer. £750.
Peterborough and District Memorial Hospital.—Hon. Asst. Surg.
Pontypridd, Llwynypia, Hospital.—Res. Asst. M.O. £300.
Portsmouth, Royal Portsmouth Hospital.—Sen. H.S. At rate of £200.
Reading, Royal Berkshire Hospital.—Pathologist, &c. £750. Also Third H.S. and Res. Anæsthetist. At rate of £150.
Royal College of Surgeons of England.—Election to Court of Examiners.
Royal Free Hospital, Gray's Inn-road, W.C.—Res. H.S.'s and Res. H.P.'s. Each £150. Surg. Reg. £200. Gyn. Reg. and Med. Reg. Each £100.
Royal Northern Hospital, Holloway, N.—Out-patient M.O. Also H.S. At rate of £125 and £70 respectively.
St. Marylebone Hospital, Ladbroke-grove, W.—Third Asst. M.O. £300.
St. Mary's Hospital for Women, &c., Plaistow, E.—Hon. Asst. P.
Sheffield, Jessop Hospital, Norton.—Res. M.O. £150.
Sheffield, Royal Hospital.—Asst. Pathologist. £500.
Sheffield, Royal Infirmary.—Asst. Pathologist, &c. £500.
South London Hospital for Women, South Side, Clapham, S.W.—Clin. Asst. 1 guinea per attendance.
Swansea Hospital.—H.S. £150.
Walsall General Hospital.—H.S. At rate of £125.
Warrington Infirmary and Dispensary.—Sen. H.S. £300.
West London Hospital, Hammersmith-road, W.—H.P., H.S. Also Aural and Ophth H.S. Each at rate of £100.
Winchester, Royal Hampshire County Hospital.—H.P. £150.
Worcestershire County Council.—Asst. County M.O. £600.

The Chief Inspector of Factories announces vacant appointments for Certifying Factory Surgeons at Carnwath (Lanarkshire) and Bruton (Somerset).

Births, Marriages, and Deaths.

BIRTHS.

BROWNE.—On Nov. 1st, at Welbeck-street, W., the wife of Denis Browne, F.R.C.S., of a daughter.
NEWMARCH.—On Nov. 1st, to Gwendoline, the wife of Dr. J. H. Newmarch, of Evelyn-gardens, S.W., of a daughter.
SPERO.—On Nov. 2nd, at Lancaster Gate-terrace, W., the wife of Dr. G. E. Spero, of a daughter.

MARRIAGES.

COLLEN—COOPER.—On Oct. 31st, at Brighton, Edward Victor Collen, B.A., M.D., to Celia Phyllis, younger daughter of the late Sir Pope Cooper, K.C.M.G., Chief Justice of Queensland.
YOUNG—BUCKLE.—On Oct. 27th, at Norbiton, Surrey, Matthew Young, M.D., to Mary Gladys Buckle.

DEATHS.

BROADBENT.—On Nov. 2nd, suddenly, at Cambridge, Reginald Broadbent, M.D., of West Parade, Bexhill.
MOORHEAD.—On Oct. 28th, at Harrow, James Herbert Moorhead, M.D., of Sunnyside, Raglan-road, Smethwick, aged 55 years.
PAULING.—On Oct. 30th, at Ashley-gardens, S.W., William Tennant Pauling, M.R.C.S., L.R.C.P., aged 61.
SELBY.—On Oct. 31st, at 16, Sunderland-terrace, W. 2, Peggy, the loving and much loved only child of the late Major R. Selby, R.A.M.C., and Mrs. Selby, after a long and painful illness borne with exemplary patience. Funeral at Lansdowne, Bath. We asked life and Thou gavest it to her.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Comments, and Abstracts.

A BROADCAST TALK ON THE ULTRA-VIOLET RAYS.

Given from the London Wireless Station on Nov. 7th by

SIDNEY RUSS, D.Sc.,
PROFESSOR OF PHYSICS, MIDDLESEX HOSPITAL MEDICAL SCHOOL.

ULTRA-VIOLET rays were discovered as long ago as 1800, but it is only comparatively recently that people other than scientists have taken much interest in them. But to get back to the beginning of the subject one has to go back as far as 1666, when Isaac Newton made his famous experiment. He let a beam of sunlight pass through a glass prism and found that this beam was apparently split into a lot of different rays, which are now known as the spectral colours.

Newton's experiment may be arranged so that the rays emerging from the prism fall on a white screen and the band of different coloured lights, ranging from red at one end to violet at the other, can be carefully examined. Between the red and violet are the bands of orange, yellow, green, blue, and indigo.

There is no definite point where the violet light stops, as some people can see a little further than others in the region of light, but no one can see any colour beyond a certain limit, and this is where the ultra-violet rays begin.

These rays are normally present in sunlight, but, as they are invisible, Newton did not detect them. Although they cannot be seen, they have a profound effect on many things; photographic plates, for instance, are much more sensitive to ultra-violet rays than to ordinary light; in fact, the discovery of ultra-violet rays was due to their chemical action. These changes are not only of great interest and importance in the study of chemistry, but also in agriculture and medicine.

The use of ultra-violet rays in medicine is often called actinotherapy, and, although this is a new name, it is not entirely a new method of treatment; in fact, it is one of the oldest. There is historical evidence that 3000 years ago the healing powers of sunlight were appreciated to some extent, and there are definite records that the ancient Egyptians, Greeks, and Romans used it as a curative agent.

Ultra-violet rays, which are one of the invisible parts of sunlight, are showered out by the sun and reach the earth in the same way as light does.

Although there is not much apparent difference on a sunny day between the sun*light* in a valley and on a mountain top 10,000 feet up, there is a great difference in the amount of ultra-violet rays reaching the two places, because 10,000 feet of air will absorb quite a large amount of these rays, especially if the air is dusty. In this way sunlight in large smoky cities is robbed of nearly all its ultra-violet. It is chiefly these rays which tan the skin, and during the coal strike in 1921, when very little fuel was burnt in open hearths, there were unmistakable signs of tanned faces among the London population, a phenomenon probably not witnessed for hundreds of years.

The ordinary artificial sources of light, either candle, lamp, gas burner, or electric bulb, do not give out much ultra-violet radiation. The best way to produce these rays artificially in any quantity is to use some sort of arc lamp, either one open to the air, like the ordinary carbon arcs used for street lighting, or a closed mercury-vapour lamp. The ultra-violet rays can be separated from light by the simple process of filtering; the screen or filter used is a special kind of glass, invented by Prof. Wood, of America, which lets through the invisible rays but stops the visible ones. This glass makes it possible for us to see what things look like with ultra-violet rays only shining on them, if it is permissible to use the word "shining." Though the rays are quite invisible they can make things light up when they fall on them, giving them a rather weird and wonderful appearance.

In the Natural Science Museum at South Kensington an exhibit has been installed showing the appearance of a number of minerals in ordinary light and under ultra-violet rays; the difference revealed is amazing. Many insects, too, show similar contrasts. Our sense of wonder is rather quickened at the thought that the dim lit night hours (which are not devoid of ultra-violet rays) may be for the more seeing world not darkness at all, but simply a change of setting, where objects inconspicuous in blazing sunlight stand out conspicuously as they transform into light the ultra-violet rays which fall on them.

If people are examined under ultra-violet rays they bear very little resemblance to their normal daylight appearance; their faces look rather like alabaster with bright

spots here and there, their hair loses all the lustre and looks something like straw, their teeth are glaringly white unless they are artificial, in which case they appear quite black. The appearance of the eyes is curiously striking, for the ordinary colouring hardly shows, but the clear covering of the eye and lens are seen to glow with a pale lavender colour which gives a weird appearance. The portrait outlined is not a very becoming one but it is full of interest, showing as it does the many different ways in which the tissues of the body respond or react to these rays.

The whole of vegetable life is directly or indirectly dependent on sunlight; and growth, which is a series of such very complicated processes, is one of the problems which chemists at the present time are trying to unravel. Prof. Baly, of Liverpool University, has found that sugar can be formed from comparatively simple compounds by the action of ultra-violet rays. Some of the vitamins about which so much is heard to-day, and which appear to be essential for our well-being, are also affected or produced by these rays. A deficiency of one of these vitamins in the diet of children gives rise to rickets. A study of the disease in the years following the war showed that, if children were given suitable doses of ultra-violet rays, they did not develop rickets even when they were fed on a diet so deficient that they would ordinarily be pretty sure to get the disease. The conclusion was naturally drawn that the vitamin was somehow produced by the rays acting on the body, although this seemed hard to believe, as ultra-violet rays scarcely penetrate through the skin. So the only possible inference seemed that the vitamin was produced by the action of the rays on something in the skin, which was then set free in the body, and so affected the general well-being of the child. This view is now generally held, and it is no exaggeration to say that the children are literally nourished by sunlight and that ultra-violet rays play some part in the process.

These rays began to be used medically in 1893 by Finsen at Copenhagen, and the splendid institute there which bears his name is a tribute to the memory of a man who died of tuberculosis, yet was able to cure the disease in certain forms in others.

In Alpine sanatoria, where patients get the benefits of the pure bracing mountain air, Finsen's ultra-violet methods are still used with some modifications. The whole body is gradually exposed to the sun's rays until the skin has become quite tanned by the exposures. In England, too, at Alton and Hayling Island, at the institutions begun by the late Sir William Treloar and organised by Sir Henry Gauvain, wonderful examples of the benefits which can be derived from life in sunshine and the open air may be seen. For many months in the year when there is so little sunshine it is necessary to use artificial sources of light and ultra-violet rays for the treatment of disease, and gradually the term "artificial sunlight" has crept into use.

The suggestion has been made in various quarters that normal healthy people should have doses of this so-called "artificial sunlight" in the dull months of the year. Why should not it be installed in our houses so that we may enjoy something like sunshine when we cannot have the real thing? Judging by the statements made during the last five years this must have been done to some extent, and many people are using these rays at their own discretion. It may be useful to remind them that these lamps are not really artificial producers of true sunlight, and that they give out rays which may turn out to be harmful in their action in some ways instead of entirely beneficial as is now generally supposed.

At the present time our knowledge of the action of ultra-violet rays is very incomplete, and it seems a very unwise policy for people to use them, either upon themselves or their children, except under proper medical supervision. Otherwise we are faced with the fact that an experiment on a very big scale is being undertaken without any direct medical control.

Extensive use of the valuable properties of these rays in the treatment of disease is being made by medical experts, but the normally healthy individual is probably better off if he enjoys real sunshine when he can get it than if he experiments with the artificial variety.

ROYAL ALEXANDRA HOSPITAL FOR SICK CHILDREN.

ON Oct. 31st, the ultra-violet light department and new operating theatre of this hospital at Brighton were inaugurated, an event which marked the completion of the new wing which was formally opened in May last by the Duke and Duchess of York. Originally, the hospital possessed only one ultra-violet lamp, but it has now five; and together with a self-contained flat for the resident medical staff, the institution may be said to have been brought thoroughly up to date. The cost of the new wing has been about £12,000.

SELECTION OF TRAM AND 'BUS DRIVERS.

THE industrial psychologist now has his part to play in the prevention of traffic accidents. The Director of the Laboratory of Experimental Psychology at the Practical School of Higher Studies, attached to the Sorbonne, Paris, has recently published the results of several years' study of the psycho-physiological selection of Paris tram and 'bus drivers.[1] In 1921 he was appointed by the Paris General Transport Company (which runs all the 'buses, trams, and Seine steamers) to examine and select all their personnel, numbering about 30,000. Before the laboratory was established, 20 per cent. of the drivers were found to be unsuitable either during or after their apprenticeship. Since the tests have been made, the proportion of failures has fallen to 3·4 per cent. The number of accidents to selected drivers during their first year's service has been 16·5 per cent. less than those happening to unselected drivers.

Candidates are first examined medically and then psychotechnically. The various apparatus and processes employed cannot be described here, but the technician will find them in Mr. Lahy's book. One of the most important tests, named the "diffused attention" test, aims at measuring the candidate's ability to take quick decisions amid the sights and sounds of a crowded street. Another measures the "emotivity" of the subject, in view of the fact that these accidents are often caused by nervous injuries due to or connected with some previous accident. It seems but a short step from the tram or 'bus driver to the chauffeur, amateur or professional. We know of no country yet where a psychological examination is made of would-be chauffeurs, though the majority oblige them to pass a mechanical test before they receive their licence. The increase in the number of street accidents in London, Paris, and New York of recent years has been appalling. If the industrial psychologist can reduce such accidents, his help should be welcomed both by chauffeurs and pedestrians.

A HALFPENNY NEWSPAPER FOR DOCTORS.

THE *Siècle Médical*,[2] which is "exclusively reserved to the corps médical," has been on sale regularly every fortnight in Paris during the last two years for 20 centimes, rather less than one halfpenny. It is safe to say that such a venture could have succeeded only under powerful auspices, and inquiry reveals that the *Matin* is the father of this promising child, who has embraced the medical profession from his cradle. In size and appearance the *Siècle Médical* is not attractive; it contains half a dozen sheets of cheap paper, printed with evil-smelling ink, and dotted about with unflattering portraits of medical experts. Its contents, however, are distinctly valuable. It really is a newspaper, not a medical journal, and almost every item would be acknowledged by a professional journalist to have "news value" for its readers. The front page is mainly given over to accounts of medical and public health congresses. Other contributions are reports of scientific societies, new items relating to medicine from the provinces and abroad, a medical bibliography, a dental page, a literary page, a wireless column, and a page for the medical motorist. A formal notice is published in each number that the *Siècle Médical* accepts no advertisements of pharmaceutical specialties addressed directly to the public. It reserves the right of refusing any advertisement, the text or object of which appears doubtful to it, or which does not live up to the standard of its readers. The majority of the advertisements printed relate to objects of daily use, but some advertise laboratory preparations and surgical supplies.

A POCKET MEDICAL DICTIONARY.

THE pocket edition of Gould's Medical Dictionary has reached its ninth issue (London: H. K. Lewis and Co., Ltd. Price 10s.). This little book, which may be carried comfortably in the coat pocket, measures 6¼ in. by 3¼ in., and in its unnumbered pages contains over 40,000 words used in medicine and the collateral sciences, with the proper pronunciation and a short definition. Some months of use are necessary to test the qualities of such a book, and as a French writer once remarked: "Le meilleur dictionnaire est celui qui est le moins mauvais." The errors are in fact very few indeed, but V stands for Vanadium and not Vanadium, while a Megohm is a million ohms and not one-millionth part of an ohm. It is almost too late to say that vitamins are "unknown substances"; quite a lot is now known about them. We are glad to see "Apple Head: A term for the broad, thick skull of dwarfs"; even some big dictionaries do not give this. "Pocket Gould" in its revised form is a safe and useful companion for any practitioner or student of medicine.

[1] La sélection psychophysiologique des travailleurs conducteurs de tramways et d'autobus. 1 Vol. Pp. 240. Fr. 48. Dunod, rue Bonaparte, Paris, 6e.

[2] Le Siècle Médical, 10, Boulevard Poissonnière, Paris. Bimensuel.

JEAN FRANCOIS COSTE.

Dr. Jean François Coste, chief physician to the French Army under Rochambeau which came to the assistance of the United States against England in the War of the Revolution, is recalled by Dr. J. E. Lane, of New Haven, Connecticut, in the *Military Surgeon* for August. Born in France in 1741, near the Lake of Geneva, he was the son of a physician, and was educated at Lyons and Paris. He met Voltaire at Ferney where he did such good work in an epidemic that Voltaire introduced him to the Prime Minister, Choiseul, who sent him to Nancy, and later to Calais. Thence he was appointed, in 1780, to Rochambeau's army, and leaving Brest on April 12th he arrived at Newport on July 11th—three months later. In America he published a pharmacopœia for the use of the hospitals; "the simpler the art of medicine," he said, "the more it is truly rich." Patients in the French hospitals were reported very neat and clean, though they did not recover better than the Americans. The French troops had good health, and Coste was thanked by Washington for what he did for the American hospitals. Returning to France he was moved from Calais to Versailles, becoming chief physician of camps and armies at the War Office. In 1790 he was appointed the first mayor of Versailles; "active, kind, and fatherly," he sought work for the people and kept the town quiet through the troubles of the time: no small success. His portrait hangs in the Hôtel-de-Ville, and shows a round face, high forehead, firm mouth, and deep-set eyes, with a kind and shrewd expression. He kept his head through the Terror, served on the health committee of the National Assembly, and went to the wars again with Napoleon till relieved of field duty in 1809, at the age of 68. He died in Paris ten years later, as chief physician of the Invalides. He had always stood up for the soldiers, and would not have economies made to their disadvantage. He was a physician, says Dr. Lane, "of ability and high character, whose long life was devoted to faithful and courageous service."

THE "A. & H." KNIFE.

THE new form of surgical knife with interchangeable blades here illustrated, is made by Messrs. Allen and Hanburys, Ltd., of 48, Wigmore-street, London, W.1, who state that the instrument is entirely of British manufacture, and that the handle is made of stainless steel. The scalpel blades, which are obtainable in three sizes, are easily and quickly inserted into or removed from

the handle, a slot and a pin being the means of attachment. The advantage of always having a sharp blade ready is, of course, obvious.

RADIOLOGY IN DENTISTRY.

THE Dental Board of the United Kingdom has published a series of four lectures delivered under their auspices last year. These lectures were: (1) The Physics of Radiology, given by Mr. G. W. C. Kaye, D.Sc.; (2) Instruments, Apparatus, and Radiographic Technique, by the late Dr. Robert Knox; (3) the Interpretation of Dental Skiagrams, by Dr. H. M. Worth; and (4) Ultra-violet Ray Treatment, by Dr. Leonard Hill. The object of the Dental Board in arranging these lectures has been to further post-graduate study. The lectures are not elementary; indeed, those who approach the subjects without some preliminary knowledge will find them rather advanced. On the purely radiographic side, highly instructive material is collected and nice judgment has been used in the choice of radiograms. Whether a collection of lectures of this sort will serve the radiographic needs of dentists quite as well as a systematic course, including practical instruction, is doubtful. Such a course would be an impossibility for many dentists, and the lectures here presented in one volume form a good substitute.

CENTENARY OF BIRKENHEAD GENERAL HOSPITAL.

THIS hospital began in 1828 as a dispensary in a small house provided by Mr. John Laird, the founder of the firm of Cammell, Laird and Co. In 1845 a new building was erected on a site given by Mr. Laird, and renamed the Birkenhead Hospital and Dispensary, and contained eight beds and two cots. The increase of population soon made it inadequate, and in 1862 Mr. Laird built a new hospital of 50 beds at his own cost upon a site given by Mr. Thomas Brassey, the contractor. The building, then called the Birkenhead Borough Hospital, was enlarged in 1882; in 1901 another ward was added; there were further extensions in consequence of the War, and in 1926 the title was changed to the Birkenhead General Hospital. There are now 156 beds, and it is hoped to raise a centenary fund of £20,000 to open free from debt the new out-patients' department now being built. The *Birkenhead Advertiser* has issued an illustrated supplement detailing the history of the institution.

A NEW VENTILATING SYSTEM.

A DEMONSTRATION was recently given in London of a new ventilating system known as Anemostat, the essential feature of which is a spreader, enabling the air passing along a duct at high velocity to be introduced into a room at a uniform low velocity. By means of this device the air in a room may be changed as often as 10 to 15 times an hour without any sensation of draught, and with high efficiency, the loss of power at the spreader being negligible. Other devices of the ventilating system are dust separators of a simple but efficient type, washing apparatus for removing gases, vapours, and organisms from the air and permitting recovery of valuable or dangerous by-products. It is claimed that 90 to 99 per cent. of the organisms present in the incoming air can be removed. Arrangements are also provided for heating, cooling, humidifying, or drying the air so that it may be delivered at any desired temperature or humidity, as well as practically free from organisms and even the finest dust. The spray diffuser for humidifying can also be used for introducing disinfectants or therapeutic agents. It is stated that the sprayer breaks one gallon of water into over eleven million parts, the resulting mist being so fine and light that it penetrates to the smallest alveoli. The apparatus is handled in this country by Anemostat, Ltd., London.

ST. THOMAS'S HOSPITAL DINNER.

IN an account of this dinner on p. 952 of our last issue one of the speeches was attributed to Mr. G. Q. Roberts, late secretary of the hospital, who is at present in East Africa. The name of the speaker should have been given as Mr. George Roberts, and he is one of the senior almoners.

AN IMPROVED ATTACHMENT FOR ARTIFICIAL LIMBS.

OUR attention has been called to a new form of body-belt for the attachment of artificial legs. The advantages claimed for it are that the use of shoulder-straps is obviated, and in many cases the provision of a hip-joint and pelvic band for short stumps is rendered unnecessary. The belt is attached to the artificial limb by straps which hold it firmly in place on the stump, while freedom of movement is obtained whether sitting (there is no inconvenient strap directly at the back of the belt), standing, or walking. The wearer can extend the leg backward or forward, or move it from right to left without fear of displacement, while the two knees can be brought together or kept apart with ease. The makers are Messrs. W. R. Grossmith, Ltd., 12, Burleigh-street, Strand, London, W.C. 2, who will supply further particulars and demonstrate the appliance to any member of the medical profession.

"*Overcrowding at Sheffield Infirmary.*"—In regard to a note under this heading in our issue of Oct. 27th, we are asked to state that the institution referred to is not the Royal Infirmary, Sheffield. "Through the long history of the institution it can truthfully be said," writes the general superintendent and secretary, "that two patients have never been placed in one bed."

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